SONY

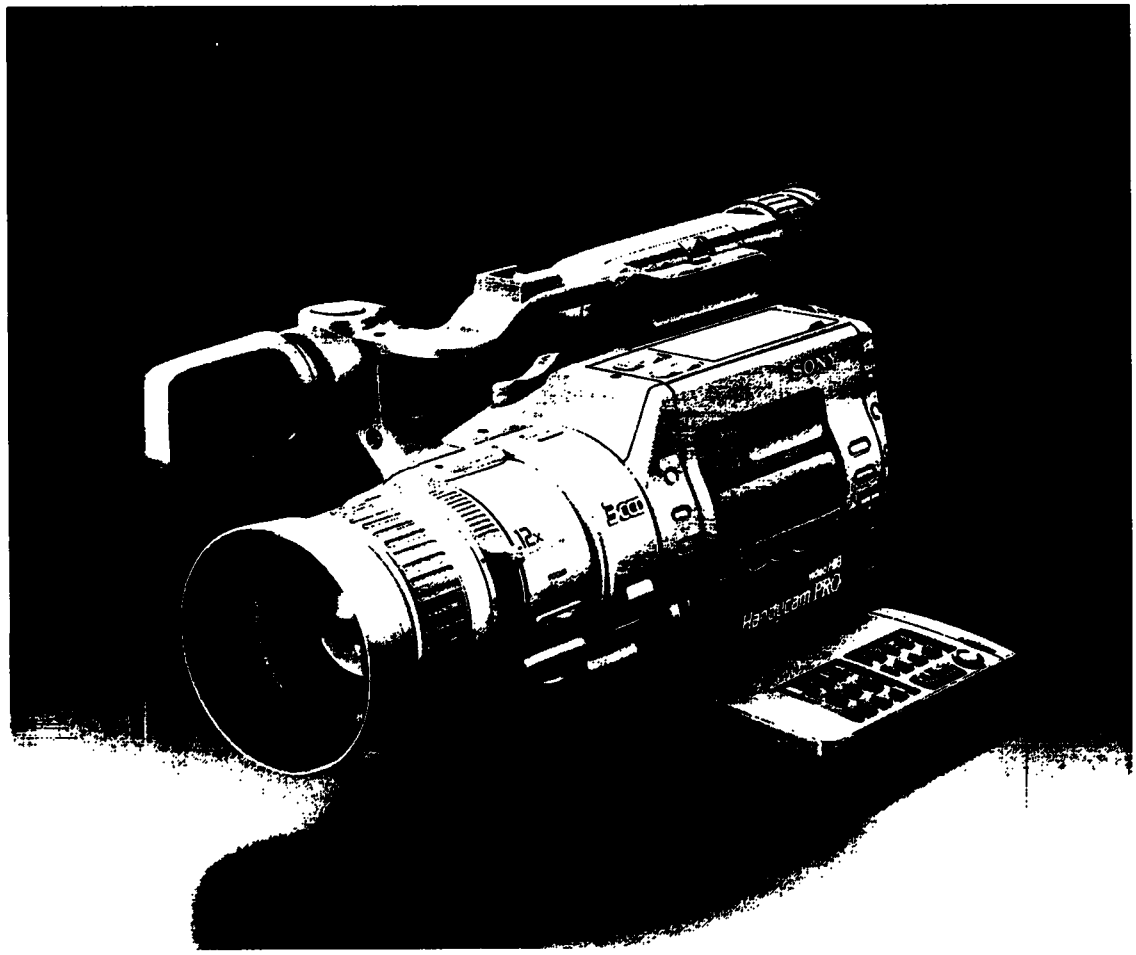
3-755-638-25 (1)

Video Camera Recorder Hi8

# CCD-VX3

## Operation Manual

Before operating this unit, please read this manual thoroughly and retain it for future reference.




videoHi8 Handycam PRO

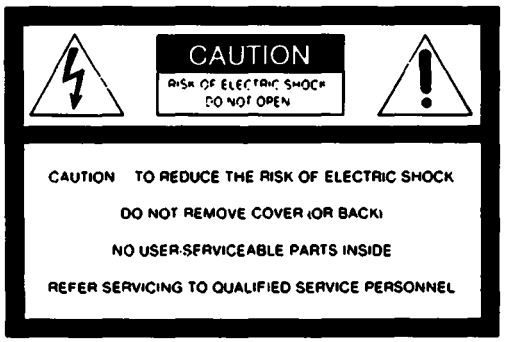
© 1992 by Sony Corporation

# Welcome to Video Hi8

Congratulations on your purchase of this Sony Handycam® Camcorder. With your Handycam, you can capture life's precious moments with superior picture and sound quality. Your Handycam is loaded with advanced features, but at the same time it is very easy to use. You will soon be producing home video that you can enjoy for years to come.

## WARNING

**To prevent fire or shock hazard, do not expose the unit to rain or moisture.**


CAUTION
RISK OF ELECTRIC SHOCK
DO NOT OPEN
CAUTION TO REDUCE THE RISK OF ELECTRIC SHOCK
DO NOT REMOVE COVER (OR BACK)
NO USER-SERVICEABLE PARTS INSIDE
REFER SERVICING TO QUALIFIED SERVICE PERSONNEL

This symbol is intended to alert the user to the presence of uninsulated "dangerous voltage" within the product's enclosure that may be of sufficient magnitude to constitute a risk of electric shock to persons.

This symbol is intended to alert the user to the presence of important operating and maintenance (servicing) instructions in the literature accompanying the appliance.

### INFORMATION

This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses and can radiate frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

- Reorient or relocate the receiving antenna.
- Increase the separation between the equipment and receiver.
- Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.
- Consult the dealer or an experienced radio/TV technician for help.

You are cautioned that any changes or modifications not expressly approved in this manual could void your authority to operate this equipment.

Television programs, films, video tapes and other materials may be copyrighted. Unauthorized recording of such material may be contrary to the provisions of the copyright laws.

**For the customer in Canada**

This apparatus complies with Class B limits for radio noise emmissions set out in Radio Interference Regulations.

## Owner's Record

The model and serial numbers are located on the bottom of the camcorder. Record the serial number in the space provided on the right hand. Refer to these numbers whenever you call upon your Sony dealer regarding this product.

Model No. CCD-VX3

Serial No. _____

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# About This Manual

If you want to shoot as soon as possible, read the chapters "Getting Started" and "Basic Operations" first. As you read through this manual, buttons and settings on the camcorder are shown in capital letters.
e.g. Set the POWER switch to CAMERA.

## Note on TV Color Systems

TV color systems differ from country to country.
To view your recordings on a TV, you need an NTSC system based TV. When you want to use a PAL-M system based TV, you will need an NTSC/PAL-M transcoder (as this is an NTSC system based camcorder). Please check the list on page 79 to see the TV color system of your country.

## Note on the Supplied RFU Adaptor

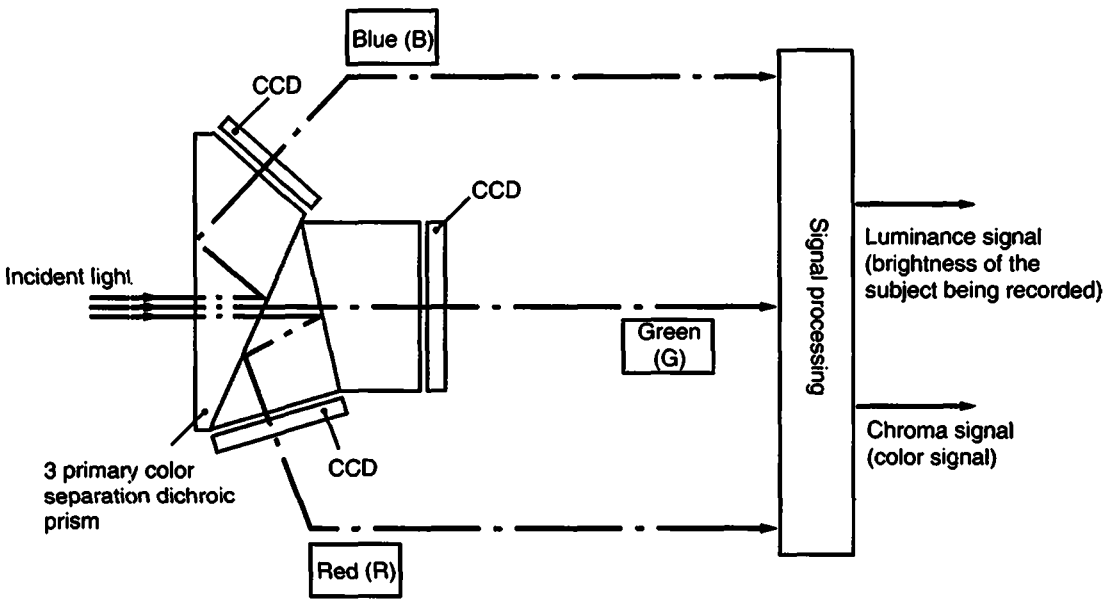
You can use the supplied RFU adaptor only in the country where you bought this camcorder. Since each country has its own electricity and TV color system, you may not be able to use the RFU adaptor when you use the camcorder abroad.

## Precaution on Copyright

Television programs, films, video tapes, and other materials may be copyrighted. Unauthorized recording of such materials may be contrary to the provision of the copyright laws.

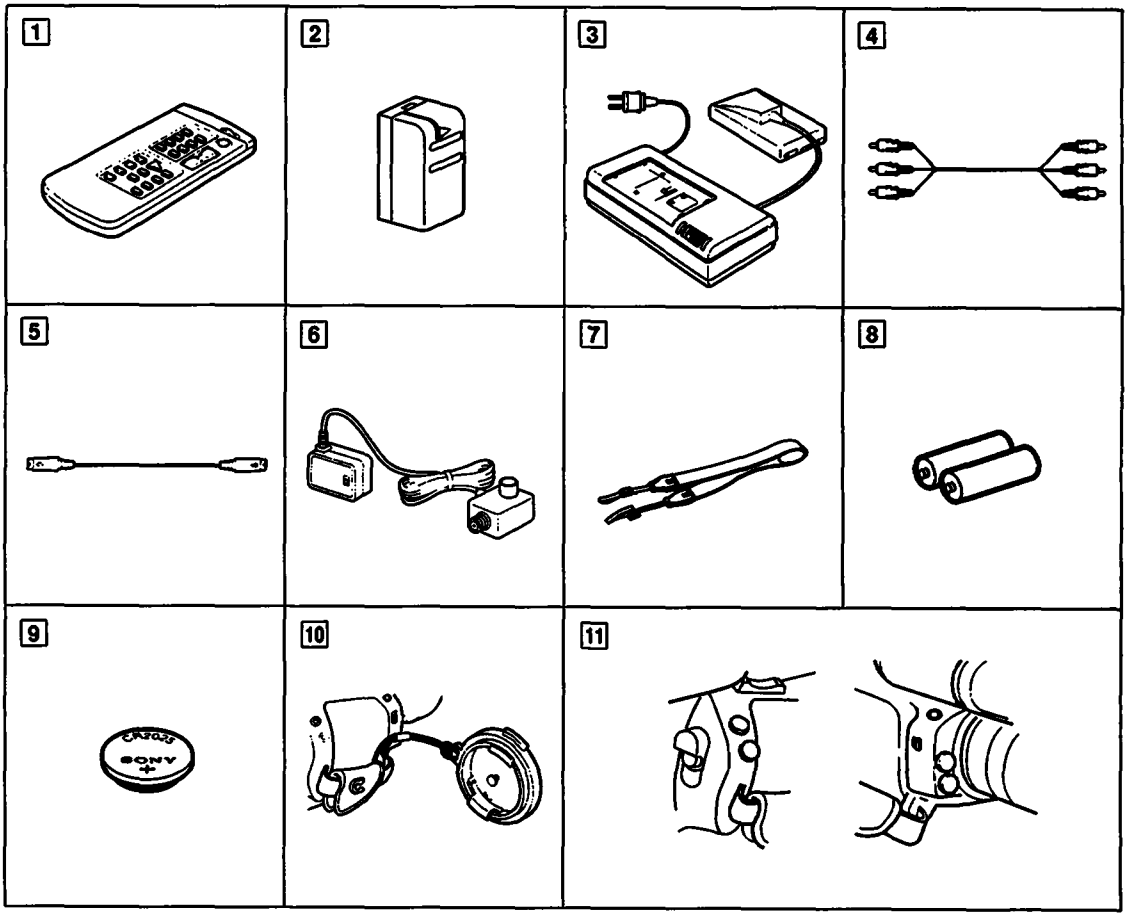
# About This Camcorder

The CCD-VX3 is a high picture quality Hi8 camcorder that uses the same 3CCD camera system found in professional video camera recorders. This system employs high density three-chip precision Charge Coupled Devices (CCDs). Each CCD image has a total of about 410,000 picture elements. An image projected by the lens is separated into three primary colors, red(R), green (G) and blue (B). Each CCD outputs a single-color picture signal.
As a result, the camcorder achieves remarkably high resolution, equal to that of a professional video camera. In addition, the system provides excellent brightness and color reproduction capabilities that allow the camcorder to record images that are faithful to the original.



# Checking Supplied Accessories

Check that the following accessories are supplied with your camcorder.




1 Wireless Remote Commander (1)(p.24, 85)

2 NP-77H Battery pack (1)(p.8)

3 AC-V35 AC power adaptor (1)(p.8, 28)

4 A/V connecting cable (1)(p.23, 72)

5 S video connecting cable (1)(p.23, 72)

6 RFU-90UC RFU adaptor (1)(p.23)

7 Shoulder strap (1)(p.86)

8 Size AA (IEC designation R6) batteries for the Remote Commander (2)(p.7)

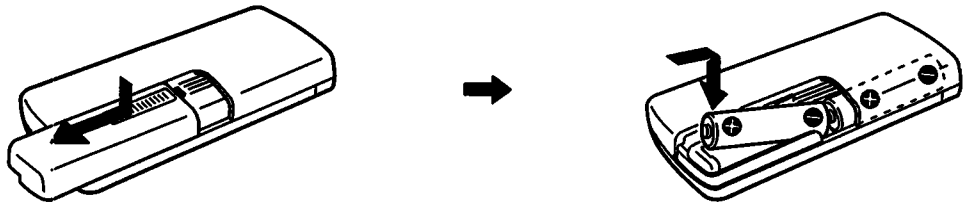
9 CR2025 lithium battery (1)(p.12)

10 Hood cap (1)(p.18)
This is attached to the camcorder.

11 Jack covers (1 set)
These are attached to the camcorder.

## Installing the Batteries into the Remote Commander

Before you use the Remote Commander, insert two size AA(R6) batteries with polarity positioned correctly.



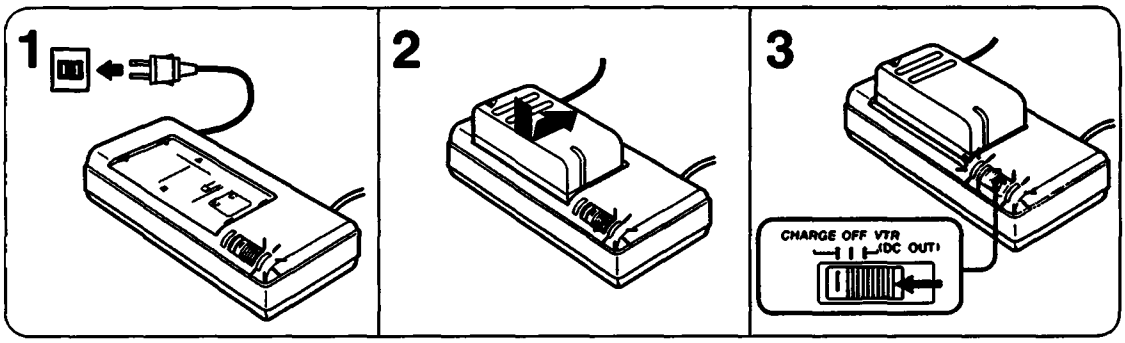
**Note on battery**

The batteries will last for about six months under normal operation. If the Commander will not be used for a long period, remove the batteries to avoid possible damage from battery leakage.

# Charging and Installing the Battery Pack

## Charging the Battery Pack

Before using your camcorder, you first need to charge and then insert the battery pack. You can use the NP-77H (supplied), NP-77HD and NP-77. Charge the battery pack with the supplied AC-V35 AC power adaptor. (1) Connect the AC power adaptor to a wall outlet. The green POWER lamp on the adaptor lights. (2) Align the right side of the battery pack (indicated by the ▶ mark) with the line on the AC power adaptor. Push down and slide the battery pack in the direction of the arrow. (3) Set the CHARGE/VTR switch to CHARGE. The orange CHARGE lamp lights and charging begins. When charging is completed, the orange lamp goes out.




***Charging time and battery life***

| Type of battery pack | Charging time* | Battery life** |
|---|---|---|
| NP-77H (supplied) | 2 hours 20 minutes | 1 hour 15 minutes |
| NP-77HD | 2 hours 20 minutes | 1 hour 15 minutes |
| NP-77 | 2 hours | 1 hour 10 minutes |

* Approximate charging time to charge an empty battery pack using the AC-V35 (Note that lower temperatures require a longer charging time.)

** Approximate continuous recording time indoors

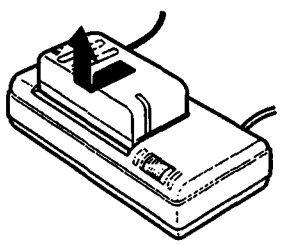
**Usable battery charger**

- AC-S10, AC-V55 and AC-V30 AC power adaptor
- BC-S10, BC-55 and BC-77 portable battery charger
- DC-S10 and DC-V30 car battery charger

Never use the battery charger other than the one recommended.

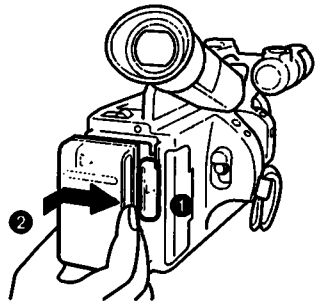
### Detaching the Battery Pack

Slide the battery pack in the direction of the arrow.



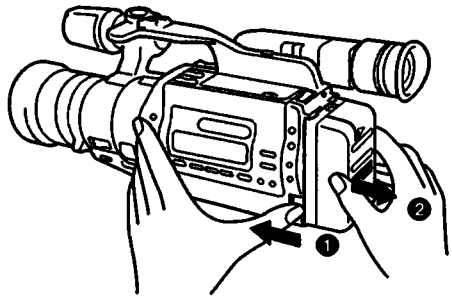
## Installing the Battery Pack into the Camcorder

Align the right side of the battery pack with the white line on the camcorder. Slide the battery pack to the right.



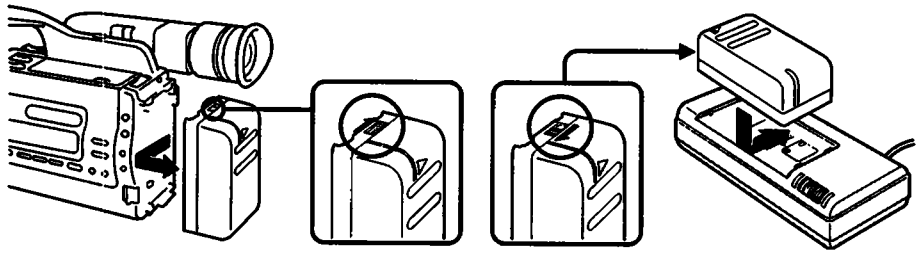

## Removing the Battery Pack

While pressing BATT, slide the battery pack out to the left.




**The switch on the battery pack**

This switch is provided to help you remember the charging status of the battery. Set the switch to the "no mark" position after charging. (When detached from the AC power adaptor, expose "no mark". When detached from your camcorder, expose the red mark.)



## Tips for Using the Battery Pack

### Note on Charging

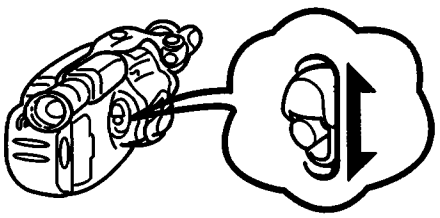
Brand-new battery pack is not charged. Before using the battery pack, charge it sufficiently. Before recharging a used battery pack, make sure to use it up. Charging the still usable battery causes a lowering of battery capacity. However, the original battery capacity can be recovered if you fully discharge and fully charge the battery again. If recording is completed before the battery indicator appears inside the viewfinder, you should remove the tape, slide the POWER switch to CAMERA, slide the STANDBY switch up, and leave the camcorder until the battery indicator flashes rapidly. You should charge batteries at temperatures from 10°C to 30°C (from 50°F to 85°F). Lower temperatures require a longer charging time.

### Preparing the Battery Pack

**Have sufficient battery pack power to do 2 to 3 times as much recording as you have planned.**
Battery life is measured by continuous camcorder recording time, at a room temperature using a fully-charged battery. Keep in mind that battery is also used by the camcorder when:

- You insert or eject a tape.
- You set the camcorder to standby mode.
- You set the POWER switch to VTR.

**To save battery power when not recording, push the STANDBY switch down to cover the START/STOP button.**
A smooth recording can be made even if recording is stopped and started again.



**Battery life is shortened in a cold environment**
Battery efficiency is decreased and the battery wears out more quickly in cold weather.

### Notes on the Battery Pack

**Notes**

- Do not allow any metal surfaces to touch the metal parts, or short circuiting may occur. Carry the battery pack attaching to the terminal cover.
- Keep the battery pack away from fire, as it may explode.
- Do not attempt to open nor convert the battery pack.
- Do not expose the battery pack to rain or moisture.
- Avoid any mechanical shock.

**Battery heat up is normal**
During charging or recording, the battery pack heats up. This is caused by energy that has been generated and a chemical change that has occurred inside the battery pack. This is not cause for concern.

**The life of the battery pack**
The battery pack can be fully charged and discharged about 500 times under normal temperatures. If the indicator flashes rapidly just after turning on the camcorder with a fully charged battery pack, the battery pack should be replaced with a new fully charged one.

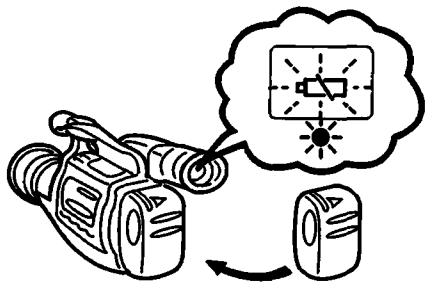
**Note on the terminals**
If the terminals (metal parts on the back) are not clean, the battery duration will be shortened. When the terminals are not clean or when the battery pack has not been used for a long time, install and remove the battery pack from time to time. This improves the contact condition. Also, wipe the + and – terminals with soft cloth or paper.

## Battery Remaining Indicator

You can check the remaining battery capacity by looking at the indicator in the viewfinder. The decreasing black bar indicates decreasing battery power. Note that the indicator shows an approximate amount of remaining battery capacity. The amount may vary with the type of battery packs.

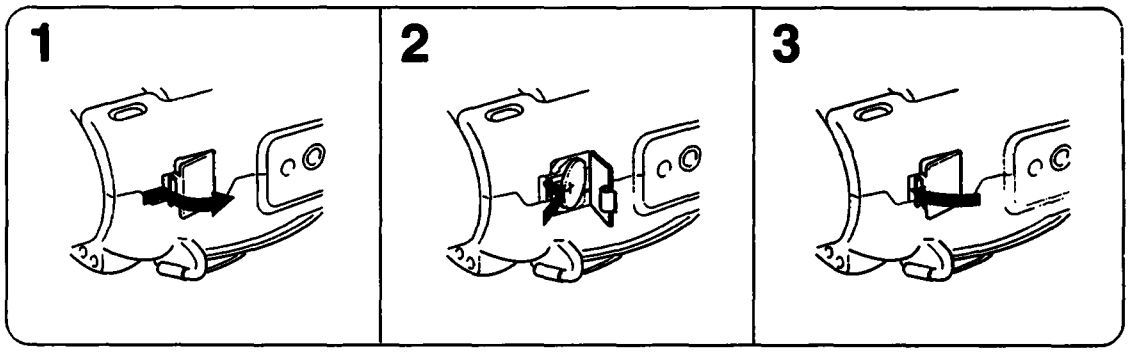
**When to replace the battery pack**

You can check the remaining battery capacity by looking at the battery life indicator in the viewfinder. When the indicator and the battery lamp in the viewfinder change from slow to rapid flashing, replace the battery pack. Set the POWER switch to OFF, and replace the battery pack. Leave the tape in the camcorder in order to obtain a smooth transition when you begin recording again.

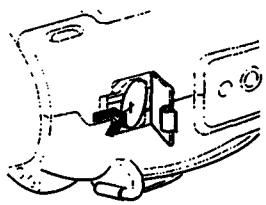


## Installing the Lithium Battery

To keep a title in the camcorder's memory, as well as to activate the clock, you must first install a lithium battery. (1) Push to open the lithium battery compartment lid at the bottom of the camcorder. (2) Install the supplied battery with the positive (+) terminal facing up. (3) Close the battery compartment lid.

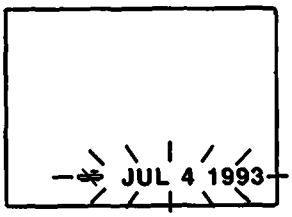


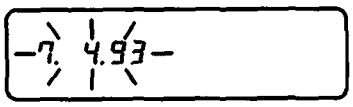

To change the lithium battery, push the battery in the direction of the arrow and pull it out to remove.



## Lithium Battery Life

The lithium battery lasts for about one year under normal operation. When the battery becomes weak or dead, the ⏱ indicator and the date or time indicator flash six times inside the viewfinder and the tape counter, or the date or time indicator keeps flashing in the display window when you set the POWER switch to CAMERA. **Replace the battery with the Sony CR2025 or Duracell DL-2025 lithium battery. Using another battery *may present a risk of fire or explosion.***




While replacing the battery, keep the battery pack or other power source attached. Otherwise, you will need to reset the date, time and title.

**WARNING**

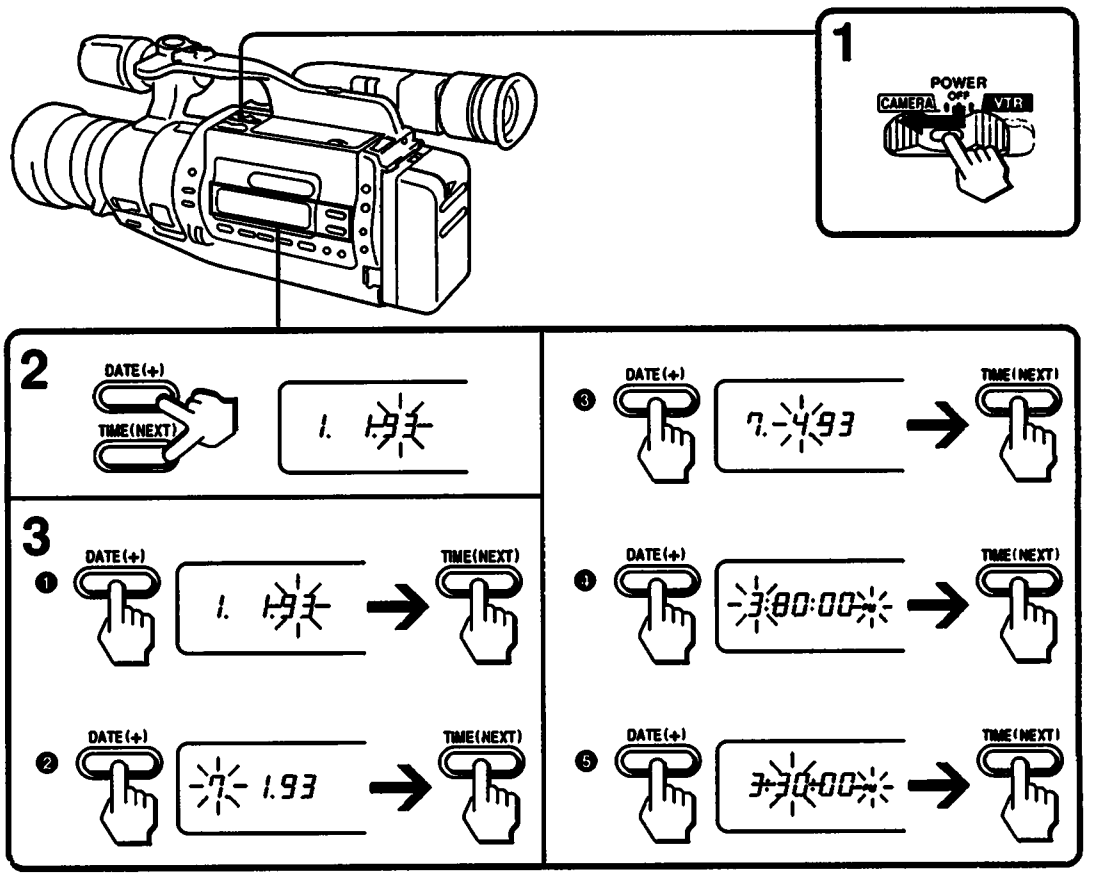
The battery may explode if mistreated. Do not recharge, disassemble, or dispose of in fire.

**Caution**

Keep the lithium battery out of the reach of children. If the battery is swallowed, consult a doctor immediately.

## Setting the Date and Time

Before setting the clock, make sure a power source and lithium battery are installed. (1) While pressing the small green button on the POWER switch and slide it to CAMERA or OFF. (2) Press DATE(+) and TIME(NEXT) simultaneously until "1.1.93" flashes in the display window. (3) Adjust the flashing digits for the year, month, day and hour by pressing DATE(+) and TIME(NEXT). To set the year to 1993, there is no need to press DATE(+) in step 3-❶. Note that when you keep DATE(+) pressed, the digits advance faster.




### To Correct the Date and Time Setting

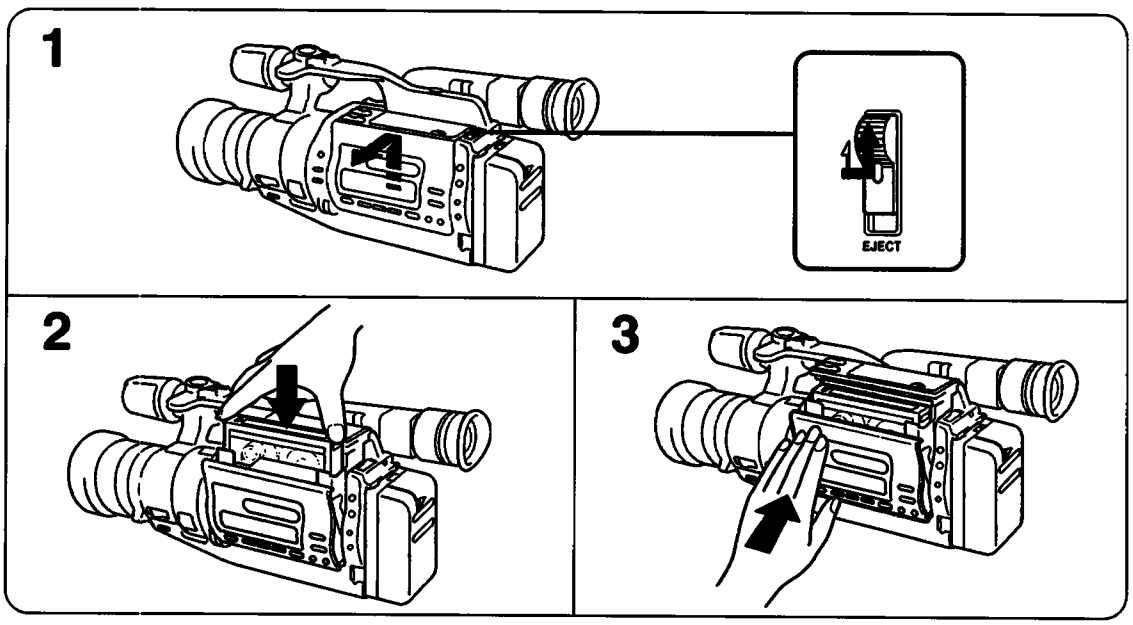
Repeat steps 2 and 3.

### To Check the Preset Date and Time

Press DATE(+) to display the date indicator in the display window. Press TIME(NEXT) to display the time indicator. When you press the same button again, the indicator goes out.

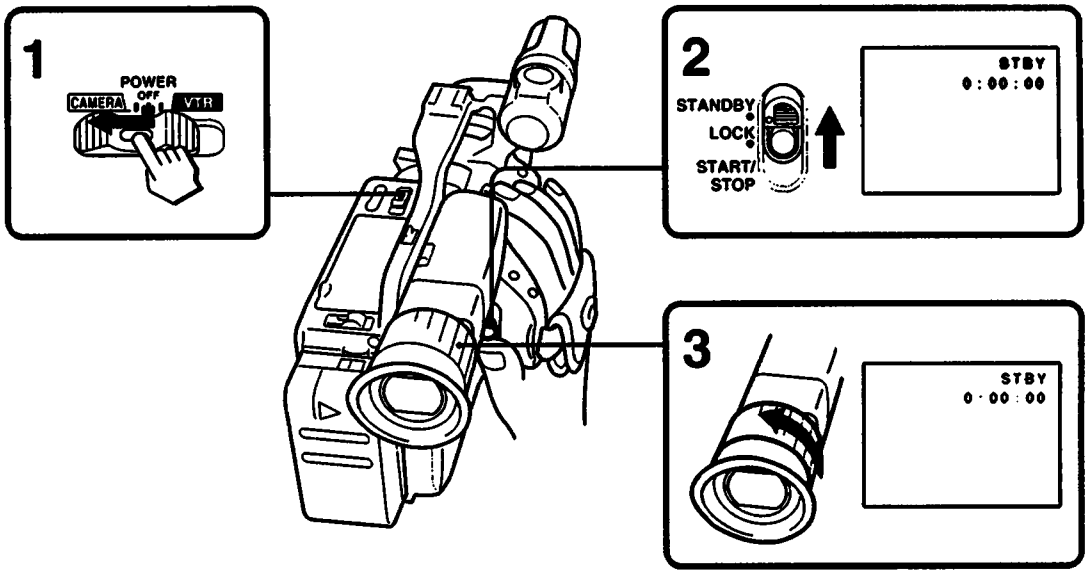
# Inserting a Cassette

Make sure that a power source is installed. (1) While pressing the small blue button on the EJECT knob, slide it in the direction of the arrow. The cassette compartment automatically lifts and opens. (2) Insert a cassette (not supplied) with the window facing out. (3) Press the PUSH mark on the cassette compartment cover to close it. **To eject the cassette, slide the EJECT knob while pressing the small blue button on it.**



# Adjusting the Viewfinder Lens

Before you use the camcorder for the first time (or after someone else has used it), focus the viewfinder lens. Make sure that the power source is connected to the camcorder. (1) While pressing the small green button on the POWER switch, slide it to CAMERA. (2) Slide the STANDBY switch up. (3) Turn the viewfinder lens adjustment ring so that the "STBY" indicator in the viewfinder comes into sharp focus.

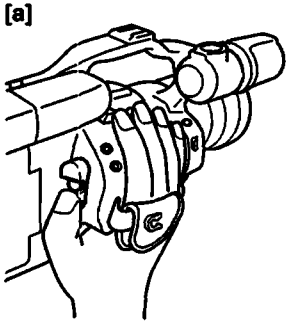


# Hints for Better Shooting

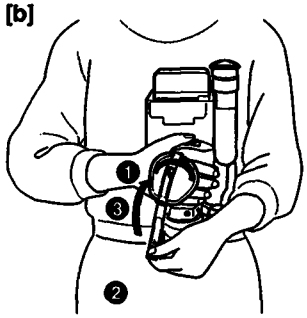
For hand-held shots, you'll get better results by holding the camcorder according to the following suggestions:

- Hold the camcorder firmly and secure it with the grip strap so that you can easily manipulate the controls with your thumb **[a]**. To adjust the grip strap, hold the camcorder against your body **[b]**.
- Place your left hand under the camcorder to support it.
- This camcorder is equipped with a Sports Finder. You can look through the viewfinder without touching your eye to it **[c]**. To do so, turn the viewfinder adjustment ring clockwise completely.
- Use the viewfinder frame as a guide to determine the horizontal plane.

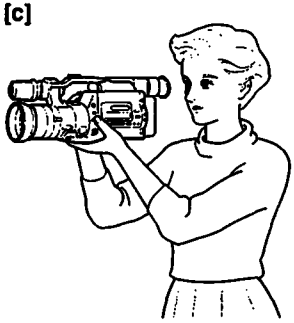
**[a]**



**[b]**

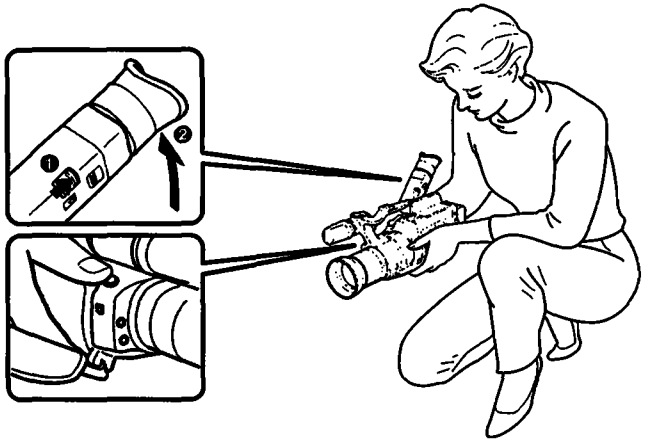



**[c]**



**To record in a low position**

You can also record in a low position to get an interesting recording angle. Push the RELEASE knob in the direction of the arrow to lift up the viewfinder. It can be turned up to 90° degrees. To start and stop recording, press REC START/STOP.

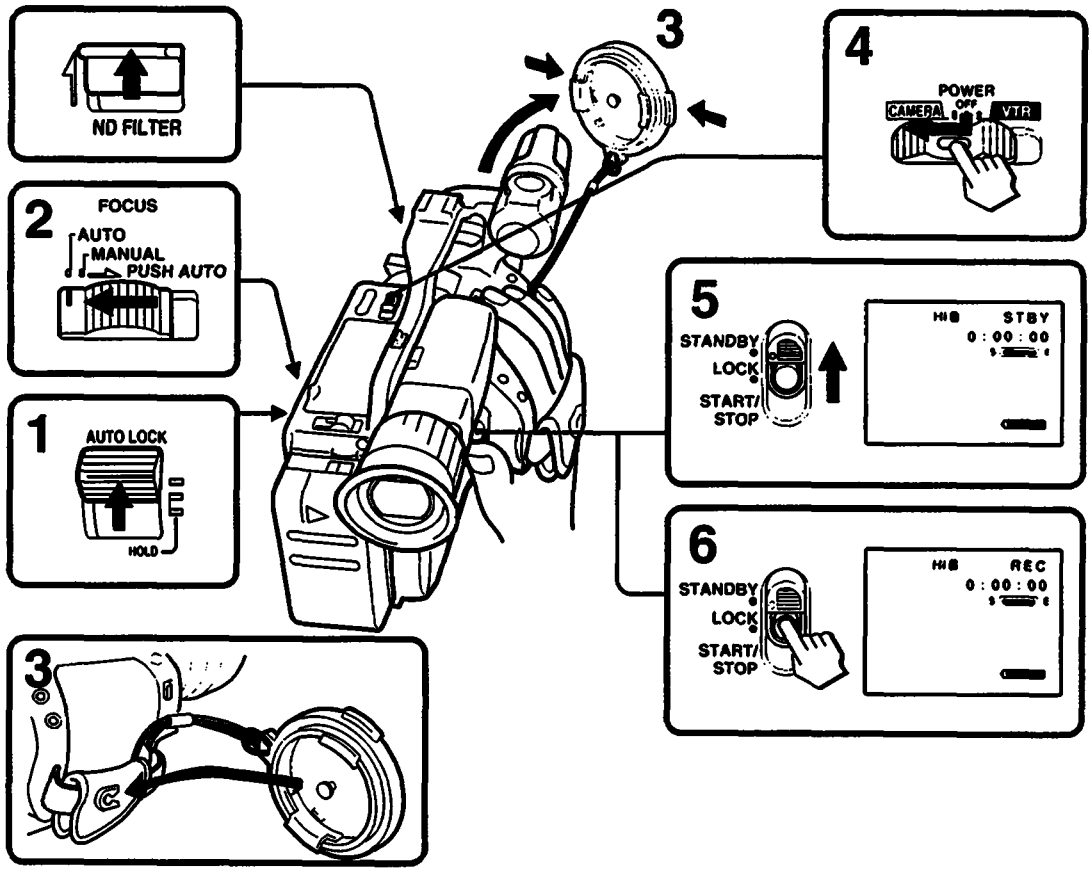



**Place the camcorder on a flat surface or use a tripod for stable shooting**

Try placing the camcorder on a table top or any other flat surface of suitable height. If you have a tripod for a still camera, you can also use it with the camcorder (p.82). To avoid damaging the camcorder, make sure the tripod screw is shorter than 6.5 mm (9/32 in).

# Camera Recording

Make sure that a power source is installed and a cassette is inserted. You can obtain a worry-free camera recording with the camcorder's full-automatic functions. Before you record one-time events, you may want to make a test recording to make sure that you are using the camcorder correctly. (1) Slide the AUTO LOCK switch up to the topmost (green) position for automatic adjustment (p.31). (2) Set the FOCUS switch to AUTO. (3) Remove the hood cap by squeezing its tabs and hook it to the cap holder on the grip strap. (4) While pressing the small green button on the POWER switch, slide the POWER switch to CAMERA. (5) Slide the STANDBY switch up until it snaps into STANDBY. (6) Press START/STOP. The camcorder starts recording, the "REC" indicator appears in the viewfinder, and the recording lamps light up inside the viewfinder and on the camcorder.




## To Stop Recording Momentarily

Press START/STOP again. The "STBY" indicator appears in the viewfinder (standby mode).

## To Finish Recording

Push the STANDBY switch down to cover the START/STOP button and slide the POWER switch to OFF. If you do not expect to continue shooting, eject the tape. (p.15)

### *Note on the internal ND filter*

Although the camcorder may be set for automatic use, the ND filter is still controlled manually. We recommend that you use the internal ND filter when the "ND ON" indicator flashes upper left corner inside the viewfinder. If the "ND OFF" indicator flashes, using the ND filter is not recommended. See page 19 for details about the ND FILTER switch.

### Note on standby mode

If you leave the camcorder in standby mode for five minutes or more with a cassette inserted, the camcorder automatically switches off. This prevents wear on the battery and the tape. To resume standby mode, slide the STANDBY switch down once and slide it up again. To start recording, press START/STOP.

**Shooting close subjects**
If you cannot get a sharp focus, press the W side of the power zoom button until the focus sharpens.

**Note on recording**
When you record from the beginning of the tape, run the tape for about 15 seconds before actual recording. This prevents the camcorder from missing any start-up scenes when you play back the tape.
You can record tapes in SP (standard play) mode only.

**Note on the tape counter**
The tape counter indicates the recording or playback time. Use it as a guide. There will be a time lag of several seconds from the actual time. To set the counter to zero, press COUNTER RESET.

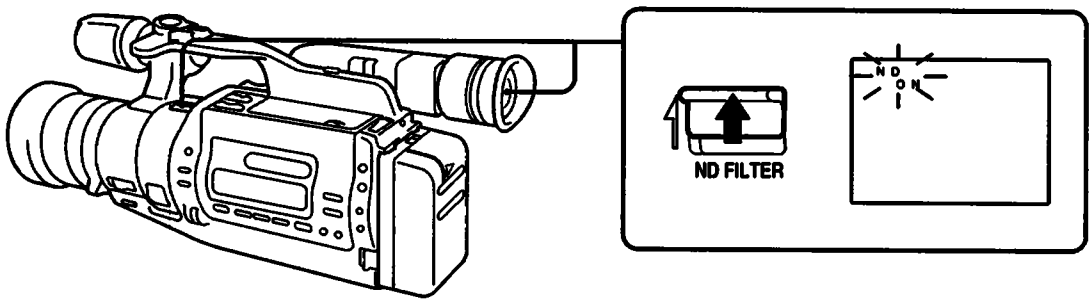
**Note on the indicators inside the viewfinder**
The remaining tape and remaining battery indicators are always displayed in the viewfinder to help you to check the approximate amount of the tape left and the remaining battery capacity. For the remaining battery indicators, see page 11.

**If the battery touches your nose**
While pressing the SLIDE switch, slide the viewfinder towards you.

**To monitor the sound to be recorded while recording**
Connect headphones (not supplied) to the Ω jack.

## Using the Internal ND Filter

You can shoot a bright scene clearly with the internal ND filter.
If the "ND ON" indicator flashes in the viewfinder while recording, slide the ND FILTER switch in the direction of the arrow. The internal ND filter automatically activates and the indicator stops flashing.




**When the "ND ON" indicator turns off and the "ND OFF" indicator flashes in the viewfinder**
This indicates that the lighting condition does not need the ND filter. Slide the ND FILTER switch again so that the indicator disappears.

**Note**
Before sliding the ND FILTER switch, set the camcorder to standby mode. If you switch during recording, the picture may shake momentarily and the switching noise may be recorded.

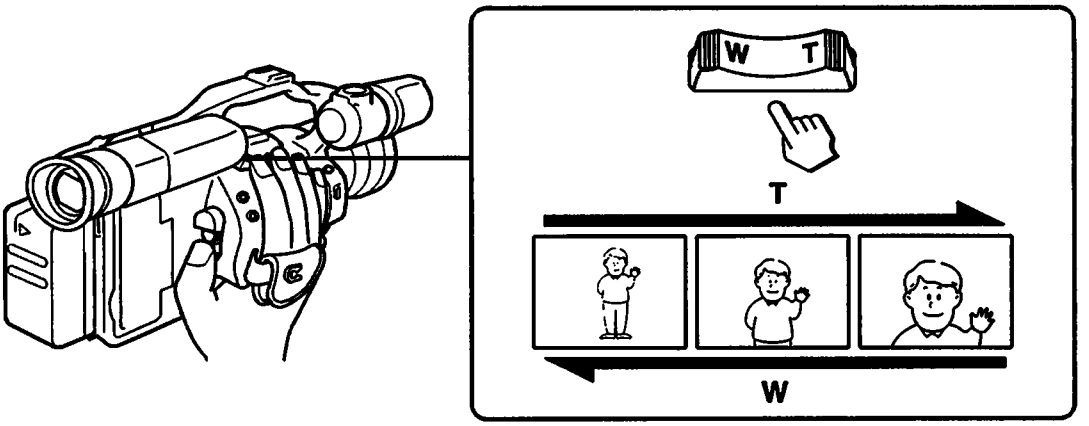
**Shooting under fluorescent, sodium, or mercury lamps**
The recorded picture may flicker or color of the picture may vary. In such case, set the ND SHUTTER mode to OFF in the menu system. (p.48)

**ND shutter feature**
In addition to the ND FILTER switch, this camcorder incorporates the ND shutter feature. See "Using an Optional ND (Neutral Density) Filter" on page 48 for details.

**ND (Neutral Density) filter**
This is a filter that reduces the amount of incident light without affecting the color. The internal ND filter of this camcorder reduces the amount of incident light to one-tenth.

## Using the Zoom Feature

Zooming is a recording technique that lets you change the size of the subject in the scene. You can also use zoom to focus manually or to decide on a shooting angle before you start recording. For more professional-looking recordings, use the zoom sparingly.
T side: for telephoto (subject appears closer)
W side: for wide-angle (subject appears farther away)




**Zooming speed**
Press the power zoom button firmly for a high-speed zoom. Press it softly for a relatively slow zoom.

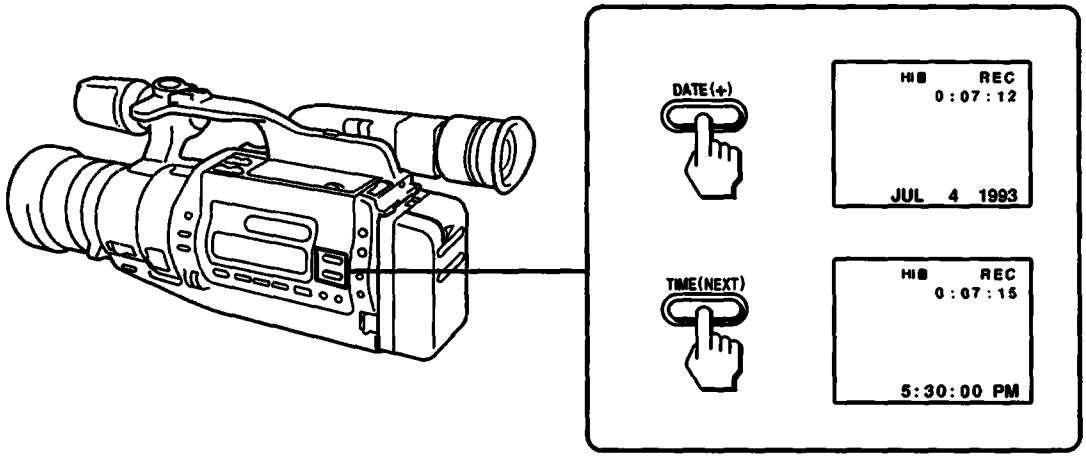
**Manual zooming**
You can also zoom using the manual zoom lever. Manual zooming enables you to control zooming speed precisely. Turn the manual zoom lever upward for telephoto shots and downward for wide-angle shots.

**When you shoot a subject using a telephoto zoom**
If you cannot get a sharp focus while in extreme telephoto zoom, press the W side of the power zoom button until the focus sharpens.
You can shoot a subject that is at least 1.2 m (about 4 feet) away from the lens surface in the telephoto position, or 1 cm (about 1/2 inch) in the wide-angle position.

**Manual focusing in macro**
You can also shoot with manual focus while doing close-ups (p.36).

## Recording the Date or Time

In Camera mode, press DATE (+) or TIME (NEXT). You can record the date or time displayed in the viewfinder with the picture. You cannot record the date and time at the same time. Except for the date or time indicator, no other indicators in the viewfinder are recorded.

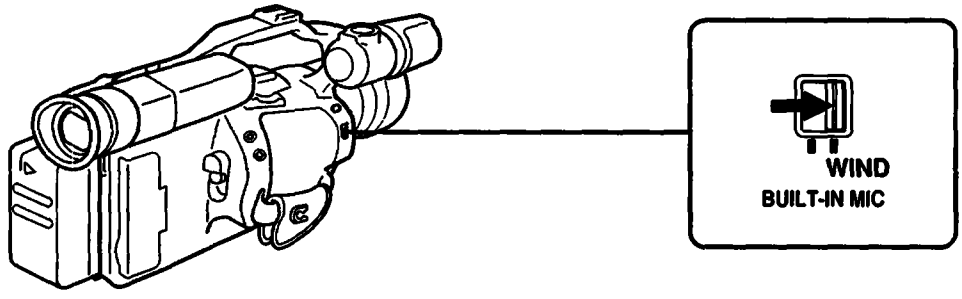



### To Stop Recording the Date or Time

Press DATE (+) or TIME (NEXT) again. Recording continues.

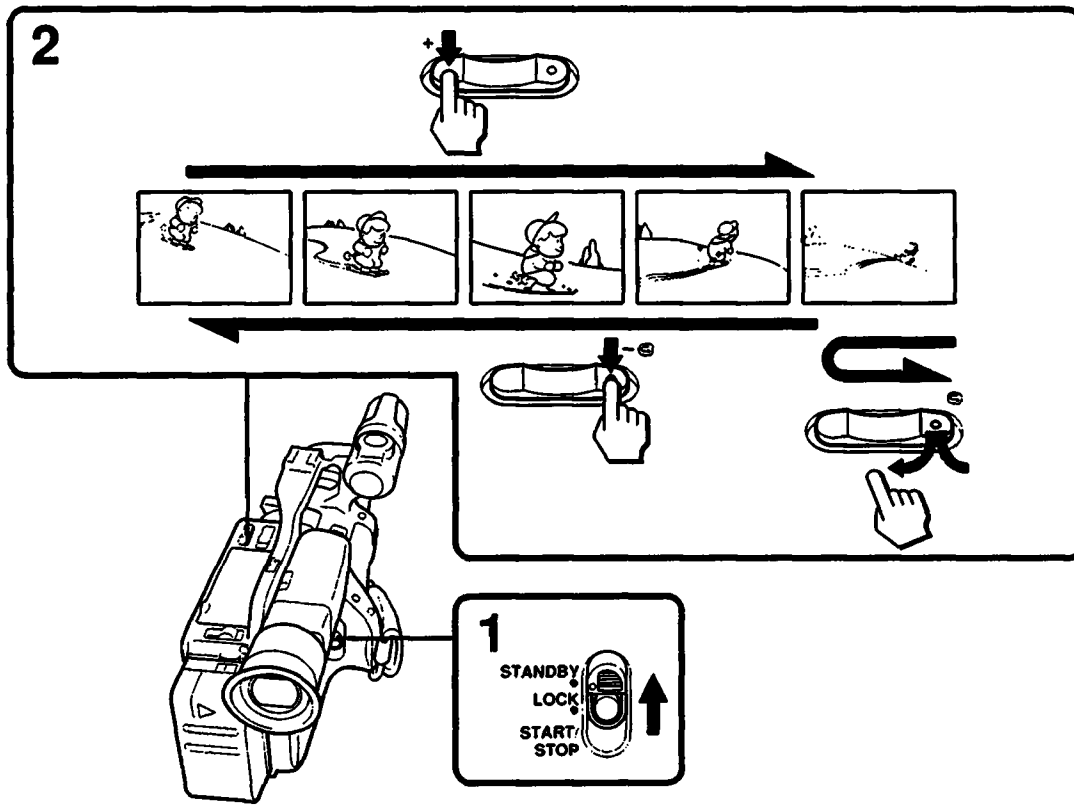
## Recording in a Strong Wind

Set the BUILT-IN MIC selector to WIND. The noise resulting from wind will be reduced. Be sure to set it to the green mark position after recording.
When recording with an external microphone connected to the MIC jack, set the selector to the green mark position.



## Checking the Recorded Picture in the Viewfinder

Using EDITSEARCH in camera mode, you can review the last recorded scene or check the recorded picture in the viewfinder. (1) Slide the STANDBY switch up until it snaps to STANDBY. (2) Press EDITSEARCH. Press the – (⏪) side momentarily, and the last few seconds of the recorded portion plays back **(Rec Review)**. Keep pressing EDITSEARCH to play back the last recorded portion **(Edit Search)**.
+ side: to view the forward playback picture
– side: to view the reverse playback picture




### Monitoring the Sound While Viewing the Playback Picture in the Viewfinder

Connect headphones (not supplied) to the ∩ (headphones) jack. Play back the tape in VTR mode (p.24).

### To Stop Playback

Release EDITSEARCH.

### To Begin Re-recording

Press START/STOP. Re-recording begins from the point you released EDITSEARCH. Provided you do not eject the tape, the transition between the last scene you recorded and the next scene you record will be smooth.

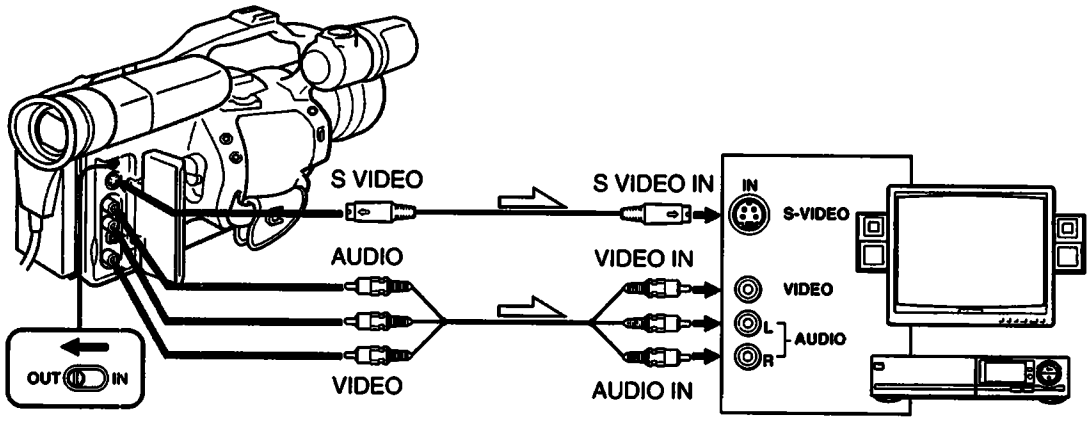
# Connections for Playback

You can use this camcorder as a VCR by connecting it to your TV for playback. There are two ways to connect your camcorder to a TV:

- With video/audio input jacks or through a VCR
- Without video/audio input jacks

## Connecting to a TV with Video/Audio Input Jacks or through a VCR

Connect the camcorder to your TV using the supplied connecting cable. Set the TV/VCR selector to VCR on the TV. When connecting the camcorder to VCR, set the input selector on VCR to LINE. Be sure to set the OUT/IN selector on your camcorder to OUT.

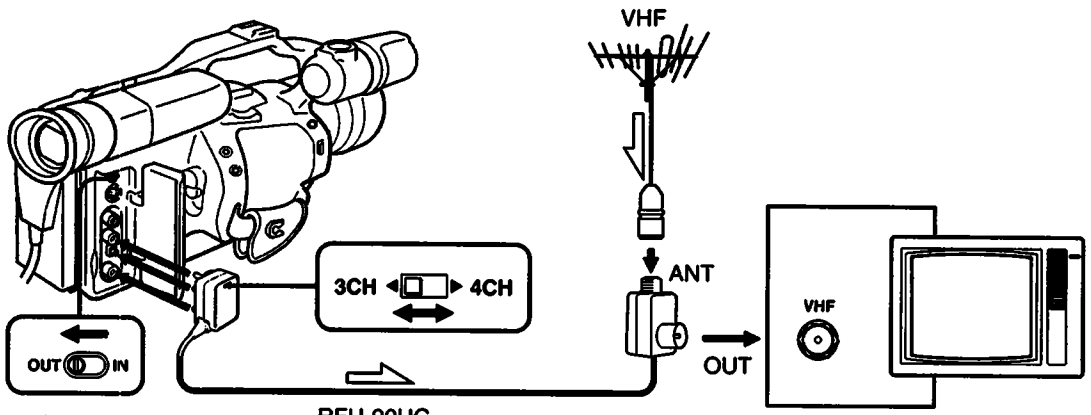



: Signal flow

If your TV or VCR is a monaural type, connect only the white plug for audio on both the camcorder and the TV or the VCR. With this connection, the sound is in monaural.
If you are going to connect the camcorder using the S video cable, you do not need to connect the yellow (video) plug of the A/V connecting cable.

## Connecting to a TV without Video/Audio Input Jacks

Connect the camcorder to the TV using the supplied RFU adaptor. Set the channel selector on the RFU adaptor and your TV channel to VHF channel 3CH or 4CH, whichever is not active in your area. Be sure to set the OUT/IN selector on your camcorder to OUT. With this connection, the sound is in monaural.

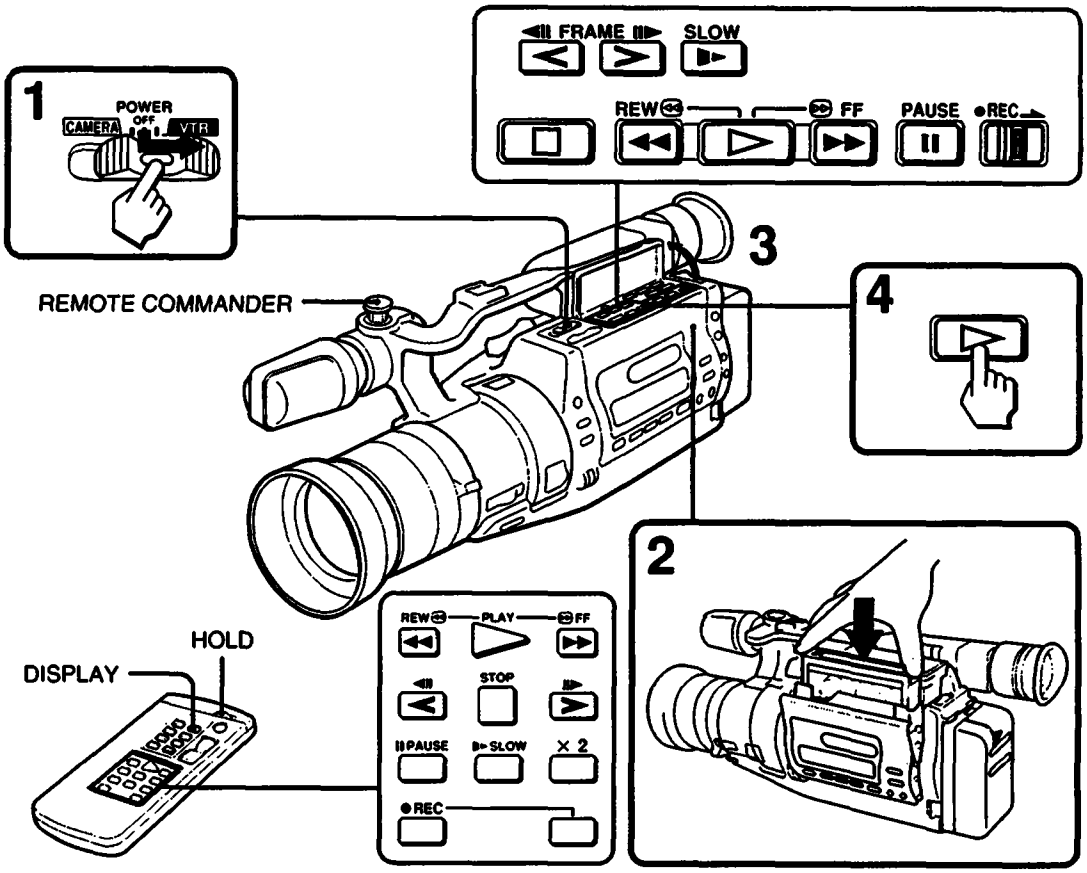



: Signal flow

RFU-90UC

# Playing Back a Tape

You can monitor the playback picture in the viewfinder. You can also monitor on the TV screen, after connecting the camcorder to the TV/VCR (p.23). You can control playback using the supplied Remote Commander (p.86). Before using the Commander, press REMOTE COMMANDER on the camcorder lightly so that the remote sensor pops up. Then slide the HOLD switch in the direction opposite the arrow. Be sure that the OUT/IN selector on the camcorder is set to OUT. (1) While pressing the small green button on the POWER switch, slide it to VTR. (2) Insert the recorded tape with the window facing out. (3) Open the lid to the control panel. (4) Press ▷. Playback starts.




**To stop playback**, press □.

**To rewind the tape**, press ◀◀.

**To advance the tape rapidly**, press ▶▶.

**To display the viewfinder screen indicators on the TV**
Press DISPLAY on the Remote Commander.
To remove the displayed indicators, press DISPLAY again.

**To select the monitor sound**
Change the "HiFi SOUND" mode setting in the menu system (p.75).

## Various Playback Modes

**To view a still picture (playback pause)**
Press II during playback. To resume playback, press II or ▷.

**To locate a scene (picture search)**
Keep pressing ◀◀ or ▶▶ during playback. To resume normal playback, release the button.

**To monitor a high-speed picture during fast-forward or rewind (skip scan)**
Keep pressing◀◀ while rewinding or ▶▶ while advancing the tape. To resume normal playback, press ▷.

**To view the picture frame-by-frame**
Press </◀II or >/II▶ in still mode. If you keep pressing the button, you can view the picture at 1/30 speed. To resume normal playback, press ▷.

**To change the playback direction**
Press </◀II for reverse direction or >/II▶ for forward direction during playback. To resume normal playback, press ▷.

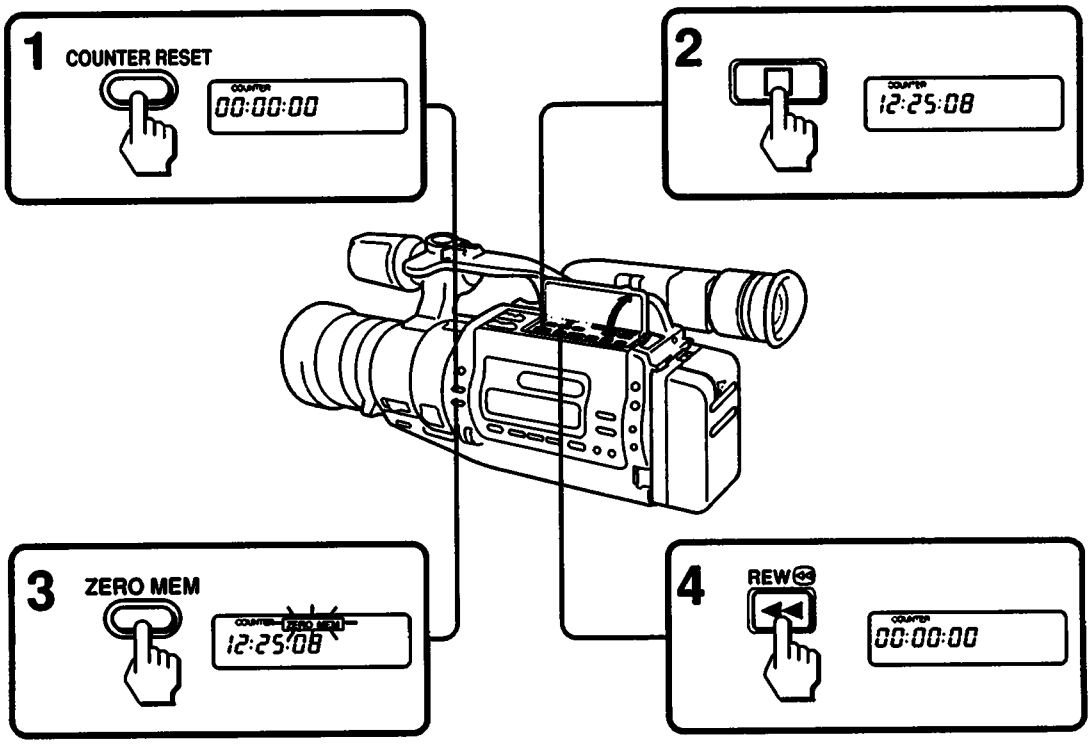
**To view the picture at 1/5 speed (slow playback)**
For reverse slow playback, press </◀II, then press I▶ during normal playback. For forward slow playback, press >/II▶, then press I▶ during normal playback. To resume normal playback, press ▷.

**To view the picture at double speed (only with the Remote Commander)**
For double speed playback in the reverse direction, press </◀II, then press ×2 on the Commander during normal playback. For double speed playback in the forward direction, press >/II▶, then press ×2 during normal playback. To resume normal playback, press ▷.

**Notes on playback**
- When still picture mode lasts for 5 minutes or more, the camcorder automatically enters stop mode.
- The sound is muted in the various playback modes. It can be heard in the double speed forward playback, but is a little noisy.
- Noise may appear in still or slow playback mode. You can adjust the picture by displaying the "PICTURE ADJUST" mode setting in the menu system (p.66).
- Horizontal noise appears at the center of the screen when you play back a tape in reverse if the RC time code or the data code is displayed on the screen. This is normal.

## Returning to a Preset Point—Zero Memory Function

The tape counter displayed in the viewfinder and the display window tells you the actual recording or playback time. You can use the tape counter to memorize a specific point on the tape and play back from that point.
If the TC indicator appears in the display window, press COUNTER/TIME CODE to turn off the indicator.
(1) During playback, press COUNTER RESET at the point you later want to locate. The counter shows "00:00:00". (2) Press □ when playback has finished. (3) Press ZERO MEM. The ZERO MEM indicator flashes. (4) Press ◀◀. The tape rewinds and stops automatically when the counter reaches approximately zero.




### To Cancel the Zero Memory Function

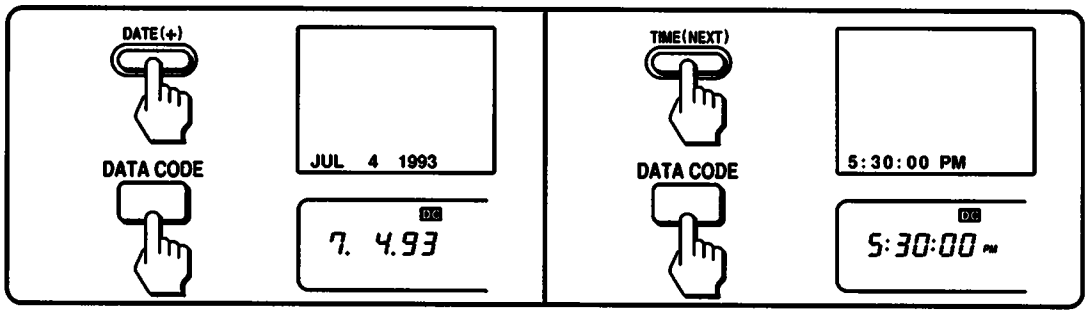
Before pressing ◀◀, press ZERO MEM again to turn off the ZERO MEM indicator.

**Note on the tape counter**

There will be a time lag of several seconds from the actual time, especially when you fast-forward or rewind repeatedly. This also happens if you play back a tape recorded in mixed LP (Long Play) and SP (Standard Play) modes.

## Displaying the Recorded Date or Time—Data Code Function

The Data Code function lets you display the recording date or time during playback, even if you did not record with the date or time. You can display the date or time in the viewfinder, the display window, and on the TV screen. Press DATE(+) or TIME(NEXT) on the camcorder or DATA CODE on the Remote Commander. Each time you press DATA CODE, the display changes to the date, time and no indicator, cyclically.




**Note on the data code displayed**

The -:--:-- appears in place of the data code when you play back:

- a blank portion of the tape
- a tape recorded in LP mode.
- a tape where the data code is illegible because of tape damage or noise.
- a tape recorded without the date and time preset
- a tape recorded on a video camera recorder that does not have the data code
- the tape in reverse by keep pressing – side of EDITSEARCH.

**Note on the indicators inside the viewfinder**

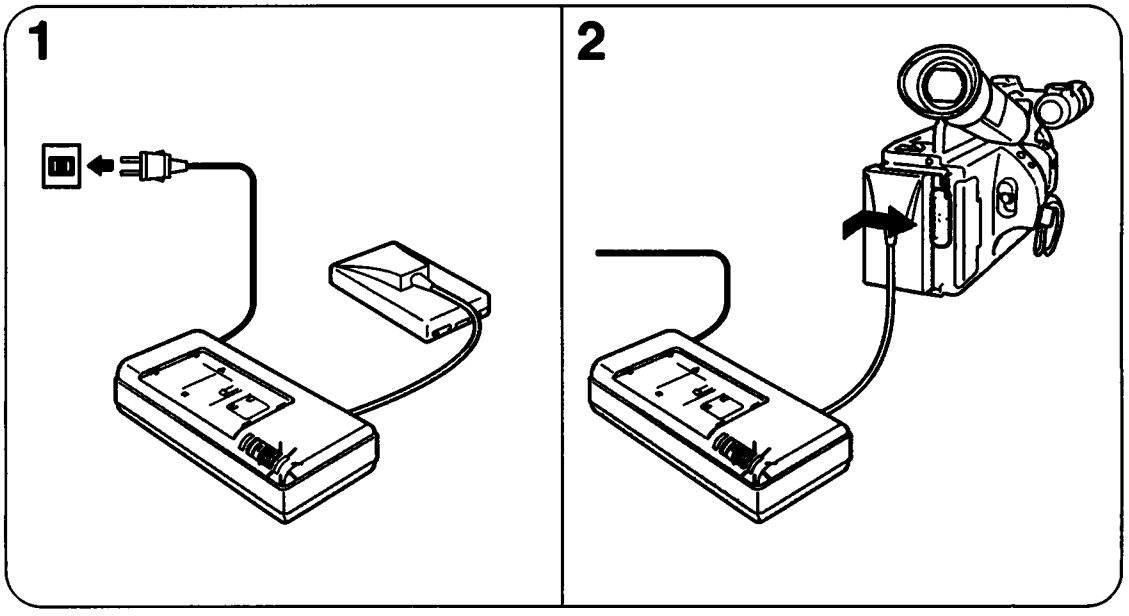
When displaying the data code, other indicators inside the viewfinder disappear. This is normal. Press DISPLAY to display them again.

# Using Alternative Power Sources

This section describes alternative power sources you can use for your camcorder: battery pack (p.8), house current and 12/24 V car battery. Choose the appropriate power source depending on where you want to use your camcorder.

## Using House Current

Use the supplied AC-V35 AC power adaptor. (1) Connect the power cord to a wall outlet. The green POWER lamp lights. (2) Align the right side of the connecting plate with the white line on the camcorder and slide it to the right.

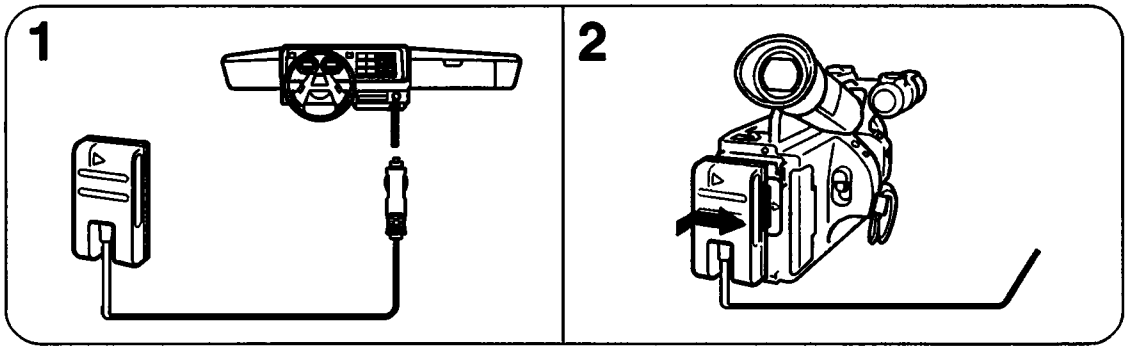



**To detach the connecting plate**
The connecting plate is detached the same way as the battery pack (p.9).

**Note on AC power adaptor**
You cannot use the AC-V25 AC power adaptor (not supplied) with this camcorder.

## Using a Car Battery

Use the DCP-77 DC pack (not supplied). (1) Connect the cord of the DC pack to the cigarette lighter socket of the car (12 V or 24 V). (2) Align the right side of the DC pack with the white line on the camcorder, and slide it to the right.




**Other option**
You can also use the AC-V55 AC power adaptor and the DCC-16A car battery cord.

# Changing the Mode Settings

To further enjoy the features and functions of the camcorder you need change the mode settings in the menu system. You can change the settings of the following items, displaying the menu in the viewfinder or the TV screen if connected to a TV. For details about each item, see the pages indicated.

## Selecting the Mode Setting of Each Item

### Items for CAMERA Mode

**Hi8 (p.75)**
- Select AUTO to have the camcorder automatically set the recording mode (Hi8 or standard 8 mm) depending upon cassette type being used.
- Select OFF to record a Hi8 tape in standard 8 mm format.

**ND SHUTTER (p.48)**
- Normally select AUTO.
- Select OFF when shooting with the optional ND filter attached to the camcorder.

**FADER (p.50)**
- Select BLK (black) when using the black fade function.
- Select WHT (white) when using the white fade function.

**ZEBRA (p.49)**
- Select OFF when shooting without the zebra pattern displayed in the viewfinder.
- Select ON when shooting with the zebra pattern displayed in the viewfinder.

**FRAME REC (p.51)**
- Normally select OFF.
- Select ON to make frame recording.

**INT REC (p.52)**
- Normally select OFF.
- Select ON to make Interval recording.
- Select SET to set the Waiting time and the Recording time for Interval recording.

**CUSTOM MODE (p.59)**
- Normally select OFF.
- Select ON to make camera recording based on the setting mode preset in the CUSTOM MODE menu.
- Select SET to preset the desired Custom mode.

### Items for VTR Mode

**Hi8 (p.75)**
- Select AUTO to have the camcorder automatically set the recording mode (Hi8 or standard 8 mm) depending upon cassette type being used.
- Select OFF to record a Hi8 tape in standard 8 mm format.

**EDIT (p.72)**
- Normally select OFF.
- Select ON to minimize the picture and sound deteriorations when editing.

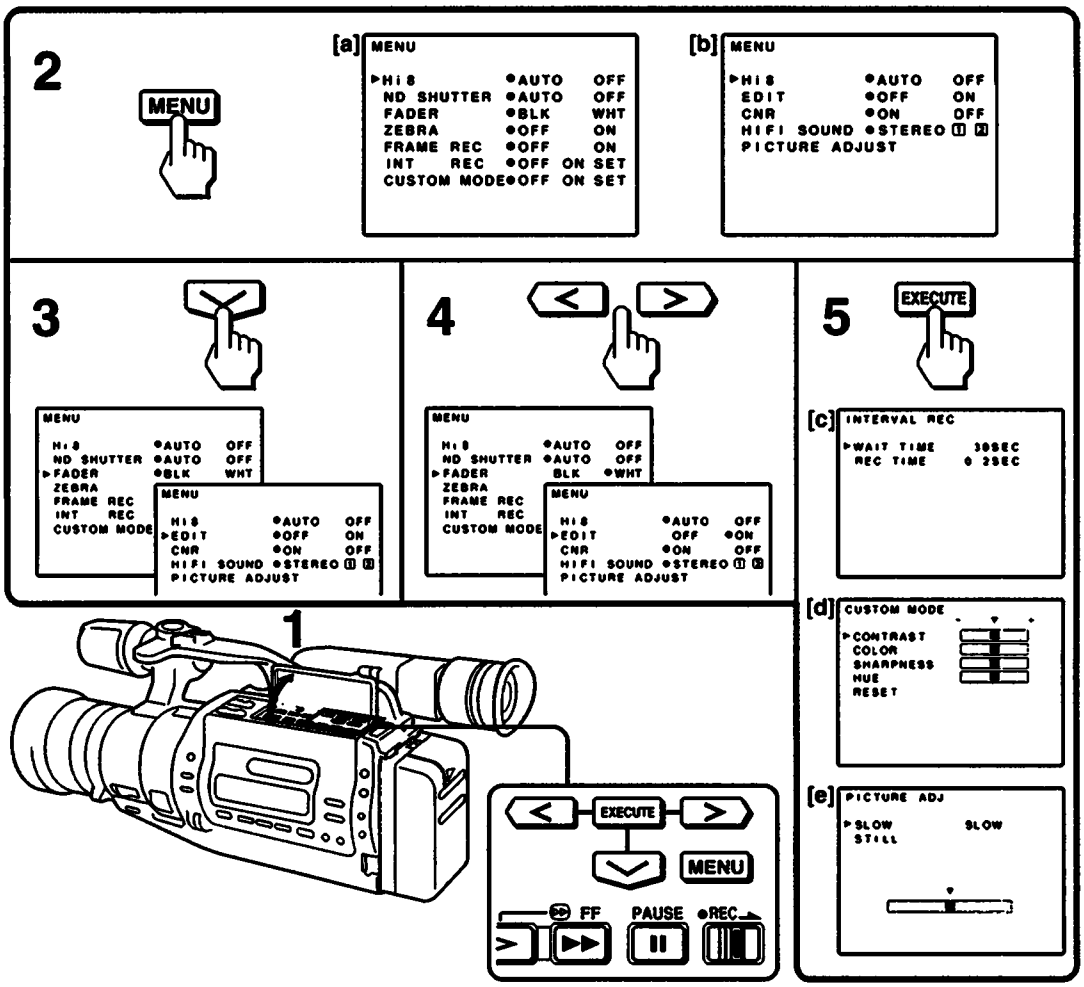
**CNR (p.67)**
- Normally select ON. You can reduce color noise in the playback picture.
- Select OFF to eliminate "color lag" that may be caused by selecting CNR ON in the playback picture.

**HIFI SOUND (p.75)**
- Normally select STEREO.
- Select [1] or [2] to play back a dual soundtrack tape.

**PICTURE ADJUST (p.66)**
Select this item to adjust a still or slow playback picture. You can adjust in the PICTURE ADJUST menu.

## Changing the Mode Settings

(1) Open the lid of the control panel. (2) Press MENU to display the menu in the viewfinder. ([a] Menu for CAMERA mode, [b] Menu for VTR mode) (3) Press v to move the cursor ► and select the desired item. (4) Press < or > to move • and select the desired mode. If you want to change other item, repeat steps 3 and 4. (5) Press EXECUTE to store the setting and erase the menu display. When you select INT REC SET, CUSTOM MODE SET or PICTURE ADJUST in steps 3 and 4, the respective setting menu is displayed to enable further settings ([c]-[e]).




**Notes on the menu system**

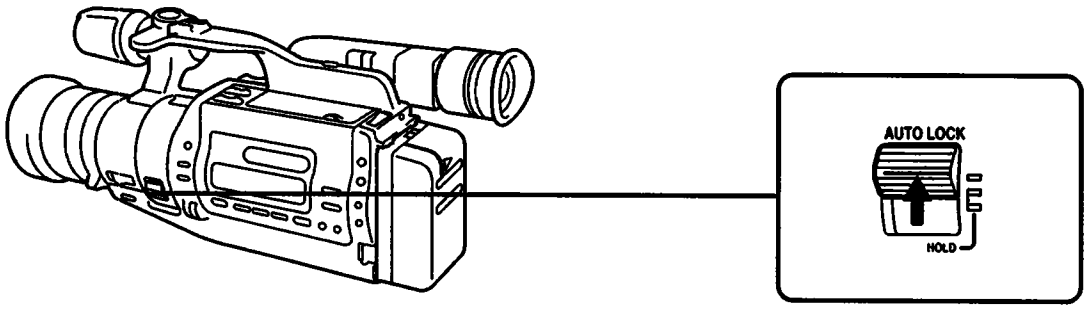
- To display the menu on the TV screen, press DISPLAY.
- To erase the menu display before executing, press MENU.
- To set two or more items in the menu at a time, move the cursor ► to select another item with v before pressing EXECUTE.
- Only when the lithium battery is installed, the settings are saved for five minutes even if you detach the power source. The settings in the INTERVAL REC menu and the CUSTOM MODE menu are saved until you change the settings, if the lithium battery is installed.

# Selecting Automatic or Manual Adjustment Modes

This section shows you how to record using manual adjustment functions. The camcorder's automatic functions offer you worry-free operation under most shooting conditions. But in some conditions, however, manual adjustment is better for creative recording.

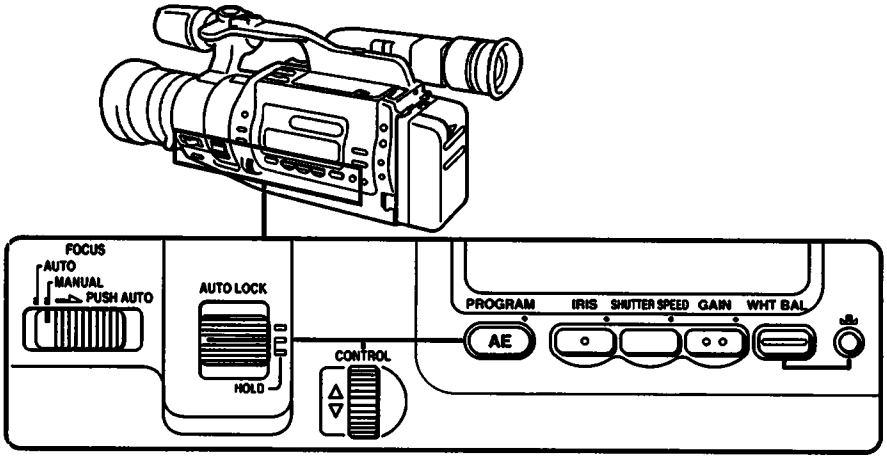
## Automatic Adjustment Mode

Slide the AUTO LOCK switch up to the topmost (green) position. In automatic mode, the camcorder adjusts the aperture, shutter speed (1/60 to 1/250), gain and white balance automatically. It also adjusts the focus automatically by setting the FOCUS switch to AUTO.




## Manual Adjustment Mode

Slide the AUTO LOCK switch down to the center position. In manual mode, you can adjust the aperture, shutter speed, gain and white balance. Only the settings you make during manual adjustment are changed. The other settings remain as they were in automatic adjustment mode. You can focus manually by setting the FOCUS switch to MANUAL. For details about each mode, see the page indicated.




**IRIS (p.43)**
(1) Press IRIS. The aperture is locked at the actual value. (2) Turn the CONTROL dial to adjust the desired aperture. You can select from 13 values, from F1.6 to CLOSE.

**SHUTTER SPEED (p.43)**
(1) Press SHUTTER SPEED. The shutter speed is locked at the actual speed. Each time you press this button, the shutter speed changes: Locked at the actual speed (1/60 – 1/250) → 1/100 → 1/1000 → Automatic (1/60 – 1/250), cyclically. (2) Turn the CONTROL dial to adjust the desired shutter speed. You can select from 16 speeds, from 1/60 to 1/10000.

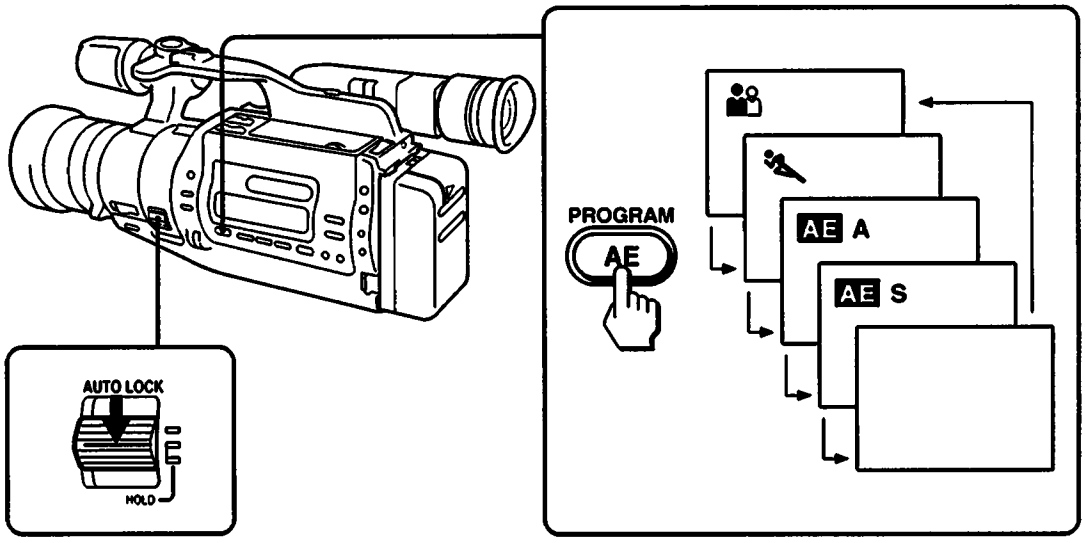
**GAIN (p.43)**
(1) Press GAIN. The gain is locked at the actual level. (2) Turn the CONTROL dial to adjut the desired gain level. You can select from 8 gain levels, from –3dB to +18 dB.

**WHITE BALANCE (p.37)**
- Each time you press WHT BAL, the mode changes: No indicator (auto) → (one-push adjustment) → (outdoors) → (indoors), cyclically.
- When you press the button in one-push adjustment mode, you can lock the white balance and record scenes without being affected by the ambient light.

**FOCUS (p.34)**
- When you set the FOCUS switch to MANUAL, you can adjust the focus manually regardless of the setting to the AUTO LOCK switch.
- As long as you push the FOCUS switch in the direction of the arrow (PUSH AUTO) during manual focus mode, you can shoot with automatic focusing.

## PROGRAM AE Modes

You can select from four PROGRAM AE modes to fit the shooting situation. Set the AUTO LOCK switch to the center position, then select the desired mode by pressing PROGRAM AE. Each time you press the button, the indicator inside the viewfinder changes: (Portrait) → (Sports) → AE A(Aperture Priority) → AE S(Shutter Priority) → No indicator(Manual), cyclically.



**Portrait Mode (p.39)**
Use Partrait mode to get a portrait effect (the subject in focus and the background out of focus). Press PROGRAM AE so that appears in the viewfinder and the display window. The aperture and shutter speed are automatically adjusted depending on the size and brightness of the subject.

**Sports Mode (p.40)**
Use Sports mode to shoot a moving subject. You can view the picture clearly with less shaking when played back later in still or slow mode. Press PROGRAM AE so that appears in the viewfinder and the display window. The aperture and shutter speed are automatically adjusted depending on the speed of the subject.

**Aperture Priority Mode (p.41) AE A, A**
Select the desired aperture, and the shutter speed is automatically set to maintain the appropriate exposure. Press PROGRAM AE so that AE A appears in the viewfinder ( A in the display window). Select the aperture with the CONTROL dial.

**Shutter Priority Mode (p.42) AE S, S**
Select the desired shutter speed, and the aperture is automatically adjusted to maintain the appropriate exposure. Press PROGRAM AE so that AE S appears in the viewfinder ( S in the display window). Select the desired shutter speed with the CONTROL dial.

## To Lock the Manual Settings

Slide the AUTO LOCK switch down to HOLD. Then the IRIS, SHUTTER SPEED, GAIN and WHT BAL buttons and the CONTROL dial do not function.

**About the previous settings**
The lithium battery must be installed to temporarily save manual settings if you detach the battery. (The settings are saved for five minutes.)

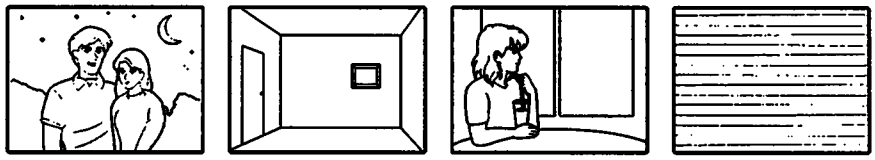
**Notes on recording in Program AE/Manual modes**
- We recommend that you adjust the focus and white balance manually.
- When recording under fluorescent, sodium, or mercury lamps, the recorded picture may flicker or color of the picture may vary.

**Shooting outdoors**
We recommend that you slide the ND FILTER switch so that the ND ON appears in the viewfinder.

# Focusing Manually

## When to Use Manual Focus

Use manual focus under the following conditions.

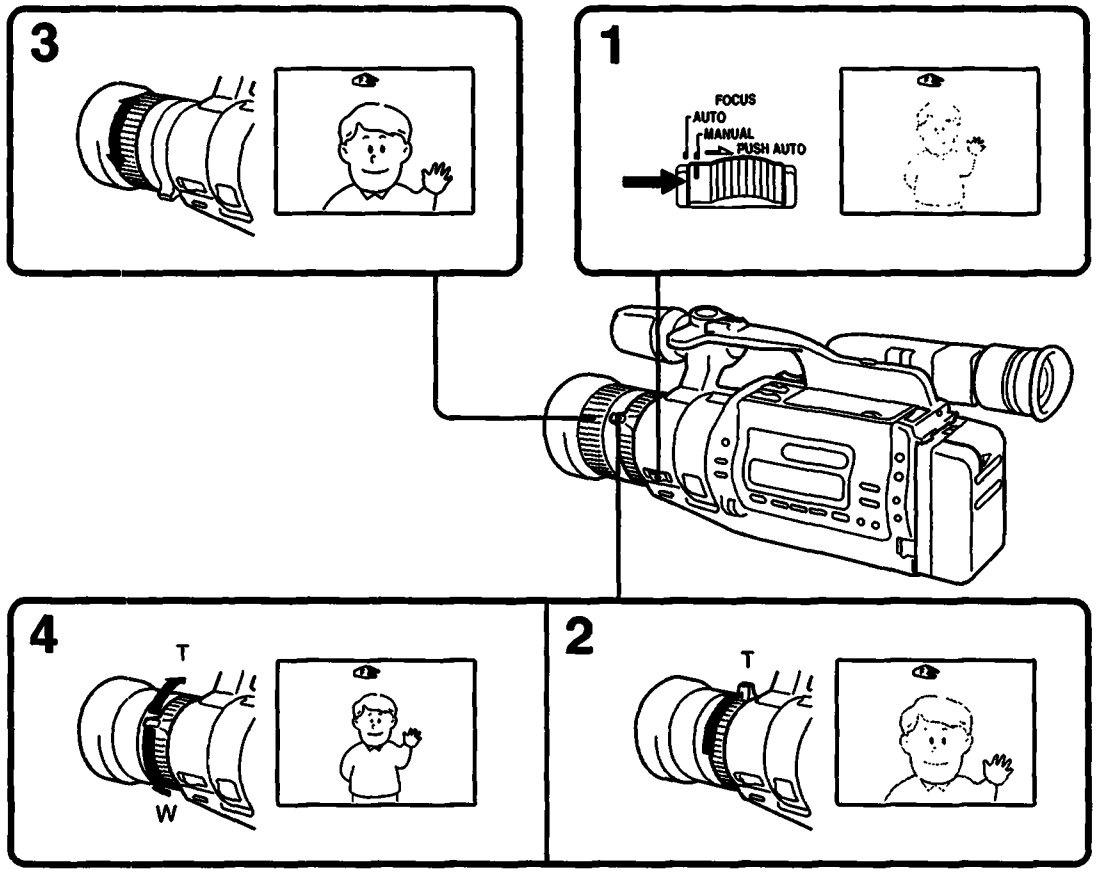


[a] [b] [c] [d]

- Insufficient light **[a]**
- Subjects with little contrast–walls, sky, etc. **[b]**
- Too much brightness behind the subject **[c]**
- Horizontal stripes **[d]**
- Subjects through frosted glass
- Subjects beyond nets, etc.
- Bright subject or subject reflecting light
- Shooting a stationary subject when using a tripod

## Focusing Manually

When focusing manually, first focus in telephoto before recording, and then reset the shot length. (1) Set the FOCUS switch to MANUAL. The ⟲ indicator appears in the viewfinder. (2) Turn the zoom lever up until the lever stops (telephoto position). (3) Turn the focus ring to adjust the focus. (4) Turn the zoom lever to set the desired shot length. You can use the power zoom button instead of the zoom lever.

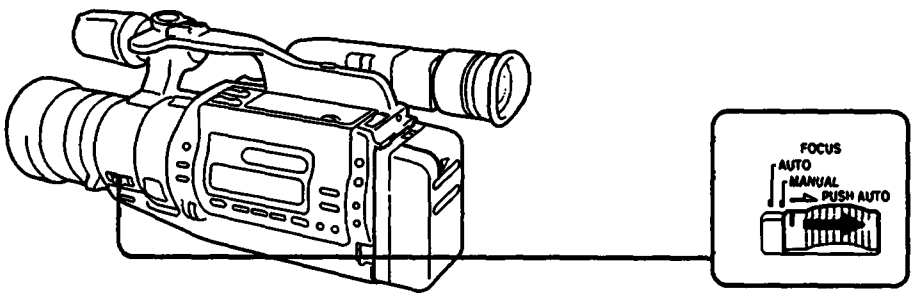



### To Reactivate Auto Focusing

Set the FOCUS switch to AUTO. The ⟲ indicator in the viewfinder disappears.

## Shooting with Auto Focusing Momentarily

Push the FOCUS switch in the direction of the arrow (PUSH AUTO). The auto focus functions while you are pushing the FOCUS switch toward PUSH AUTO. When you release the switch, manual focusing resumes. Use this switch to focus on one subject to the other with smooth focusing.




**Shooting in relatively dark places**
Shoot at wide angles after focusing in telephoto.

**Shooting a scene with lots of movement in bright light**
Set the zoom lever fully to the wide-angle position.

**Close-ups (Macro)**
1 Set the FOCUS switch to MANUAL.
2 Turn the zoom lever down to the wide-angle position until it stops.
3 Turn the focus ring to adjust focus.

# Adjusting the White Balance

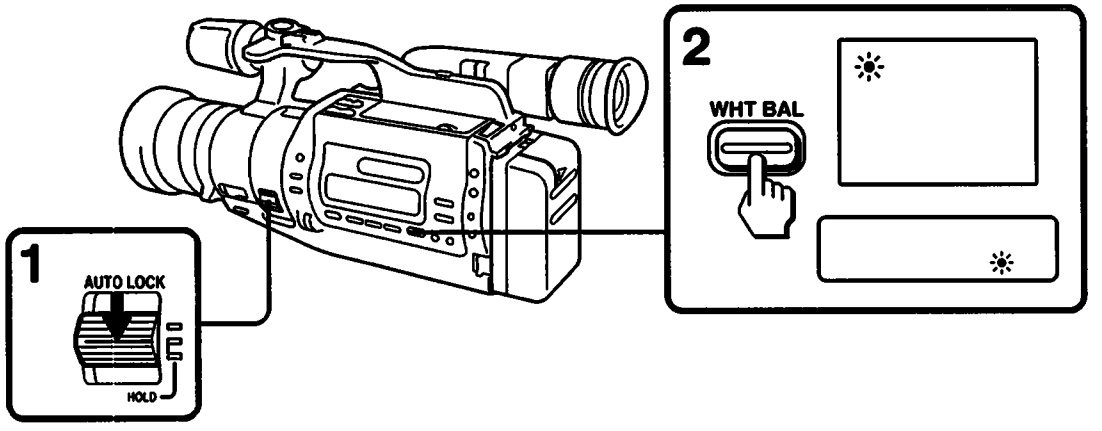
## When to Adjust the White Balance Manually

White balance adjustment makes white subjects look white and gets more natural color balance for camera recording. You can obtain better results by adjusting the white balance manually under the following conditions:

| Conditions | White balance mode (Indicator inside the viewfinder) |
|---|---|
| Lighting conditions change quickly | (Indoor) |
| Conditions too bright, such as in photography studios | |
| Under sodium lamps<br>Under mercury lamps | |
| Monochromatic subject or background | |
| Recording outdoors: e.g.neon signs, fireworks | (Outdoor) |
| Scenes after sunset or before sunrise | |
| Under a color matching fluorescent lamp | |

## Adjusting the White Balance

(1) Slide the AUTO LOCK switch down to the center position. (2) Press WHT BAL repeatedly to select the appropriate white balance mode. Each time you press the button, the mode (indicator inside the viewfinder) changes: Auto (no indicator) → One-push ( ) → Outdoor ( • ) → Indoor ( ), cyclically.

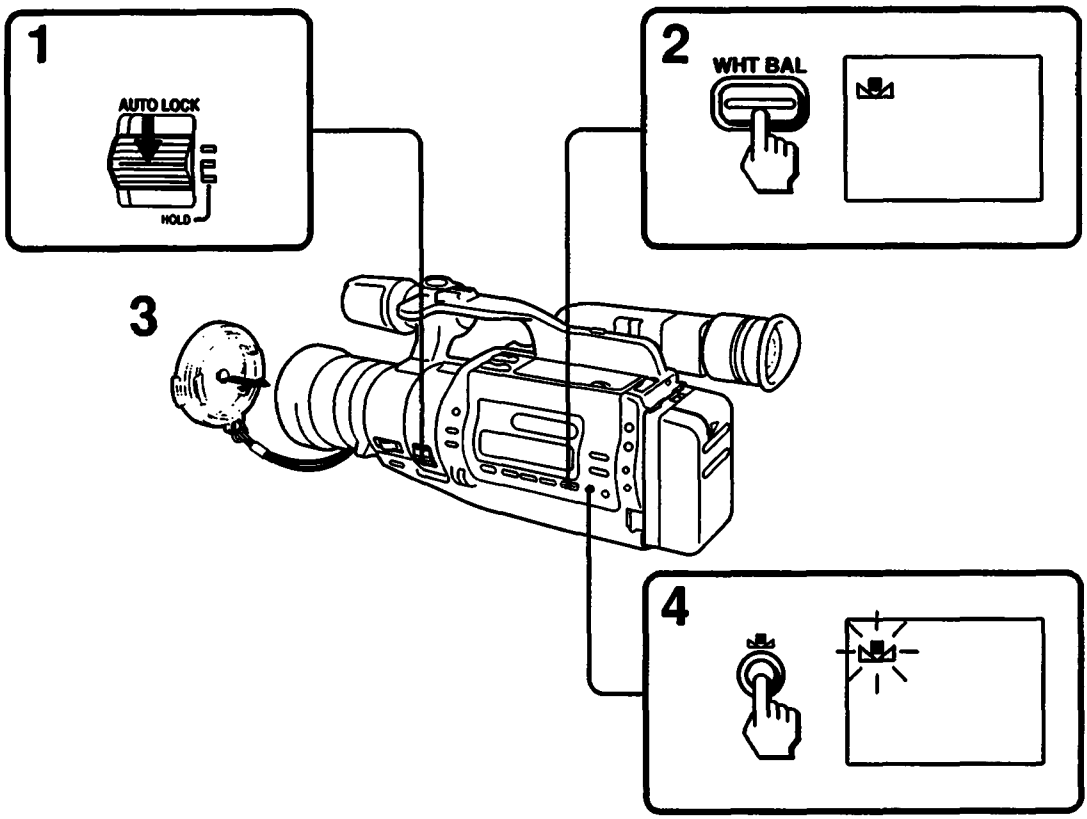



### To Return to Automatic White Balance Mode

Press WHT BAL until no indicator appears in the viewfinder or slide the AUTO LOCK switch up to green position.

## Locking the White Balance Setting (One-Push White Balance Mode)

When you set the white balance to one-push white balance mode, the setting is locked and maintained even if lighting conditions change. You can achieve recording with natural colors without being affected by ambient light. (1) Slide the AUTO LOCK switch down to the center position. (2) Press WHT BAL repeatedly to display the indicator in the viewfinder. The indicator flashes slowly. (3) Attach the supplied white hood cap to the camcorder and point it at a subject (when shot outdoors) or to the light source (when shot indoors). (4) Press the button. The indicator flashes rapidly. When the white balance has been adjusted and stored in the memory, the indicator stops flashing.




**Notes on the indicator in the viewfinder**

- The state of the indicator shows as follows:
  Slow flashing: White balance is not adjusted.
  Fast flashing: White balance is being adjusted after pressing the button.
  Lights up: White balance has been adjusted.
- When the indicator remains flashing even if you press the button, shoot in automatic white balance mode. Press WHT BAL until no indicator appears in the viewfinder.

**Shooting when the lighting condition changes**

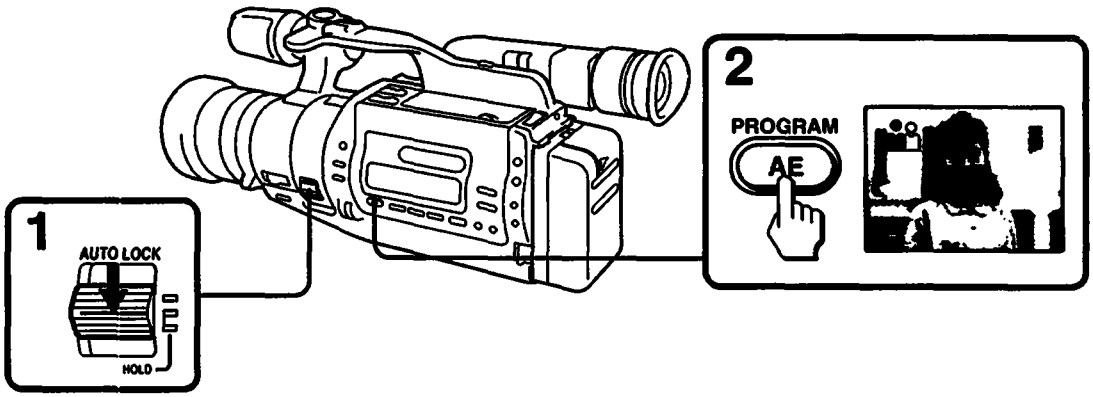
- When the lighting condition has changed, readjust the white balance with the button during recording standby mode. (This button does not function during recording.)
- When you adjust the aperture and shutter speed manually, and move from indoors to outdoors or vice-versa, slide the AUTO LOCK switch up (green position), then slide it down to the center position again.
- When you move from indoors to outdoors or vice-versa, or detach the battery for replacement while shooting in automatic white balance mode, point the camcorder to a white subject about 10 seconds before you start recording.

# Using Portrait Mode

You can get a portrait effect, that is, the subject in focus and the background out of focus. The aperture and the shutter speed are automatically adjusted to maintain the appropriate exposure depending on the size and brightness of the subject. The portrait mode is effective when used in the following cases:

- A still subject, such as a person or flower
- Subject behind an obstacle, such as a net
- Zooming in on a subject in telephoto

(1) Slide the AUTO LOCK switch down to the center position. (2) Press PROGRAM AE repeatedly so that appears inside the viewfinder.

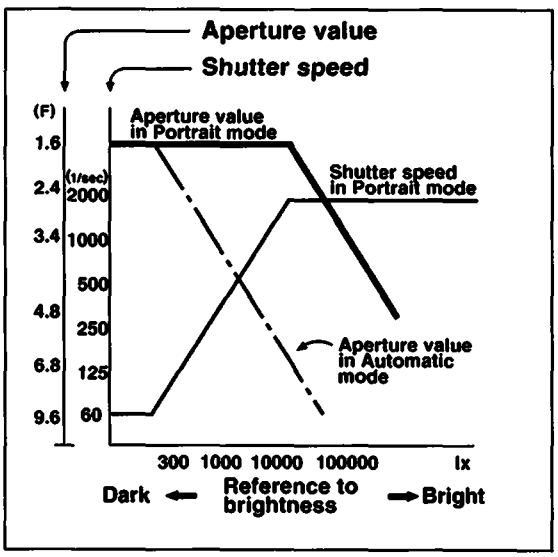



**Hint for effective camera work**

Using portrait mode, you can make the background go out of focus gradually while keeping the subject in focus. In portrait mode, slide the AUTO LOCK switch up to the topmost position and start recording. Then slide the AUTO LOCK switch down to the center position. The camcorder enters portrait mode.

**Theory of the portrait mode**

When shooting outdoors under bright sunlight in automatic mode, the aperture tends to close and both the subject and the background come into focus (deep depth of field). This is a result of excessive light. In order to bring the subject in focus and keep the background out of focus (shallow depth of field), the aperture should be opened. In portrait mode, the aperture is controlled to open by automatically adjusting the shutter speed (between 1/60 and 1/2000 depending on the shooting situation) to maintain the appropriate exposure.

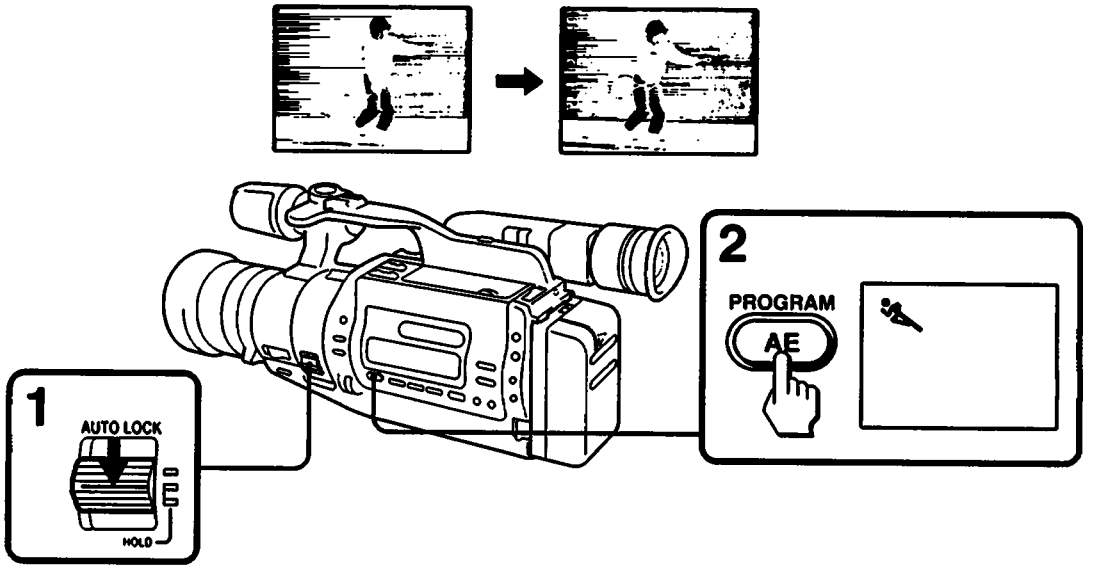


# Using Sports Mode

You can record a subject with high-speed action and view the picture with less shaking when played back in still or slow mode. The shutter speed and the aperture are automatically adjusted to maintain the appropriate exposure depending on the speed of the subject. The sports mode is effective when used in the following cases:

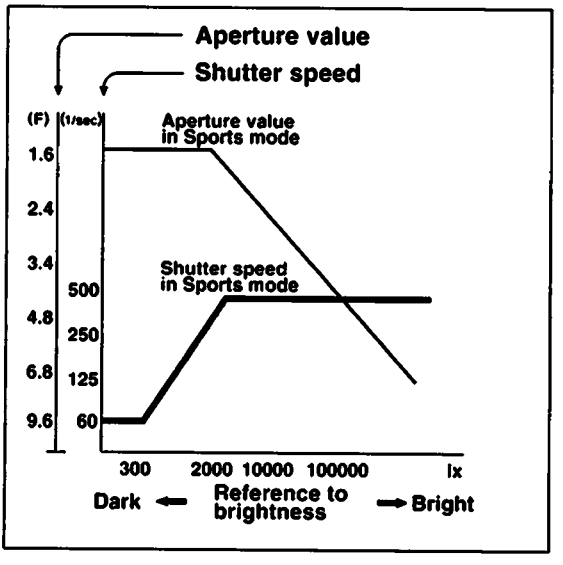
- Outdoor sports scenes such as football, tennis, golf or skiing
- A landscape shot from a moving car

(1) Slide the AUTO LOCK switch down to the center position. (2) Press PROGRAM AE repeatedly so that the 🏃 indicator appears inside the viewfinder.



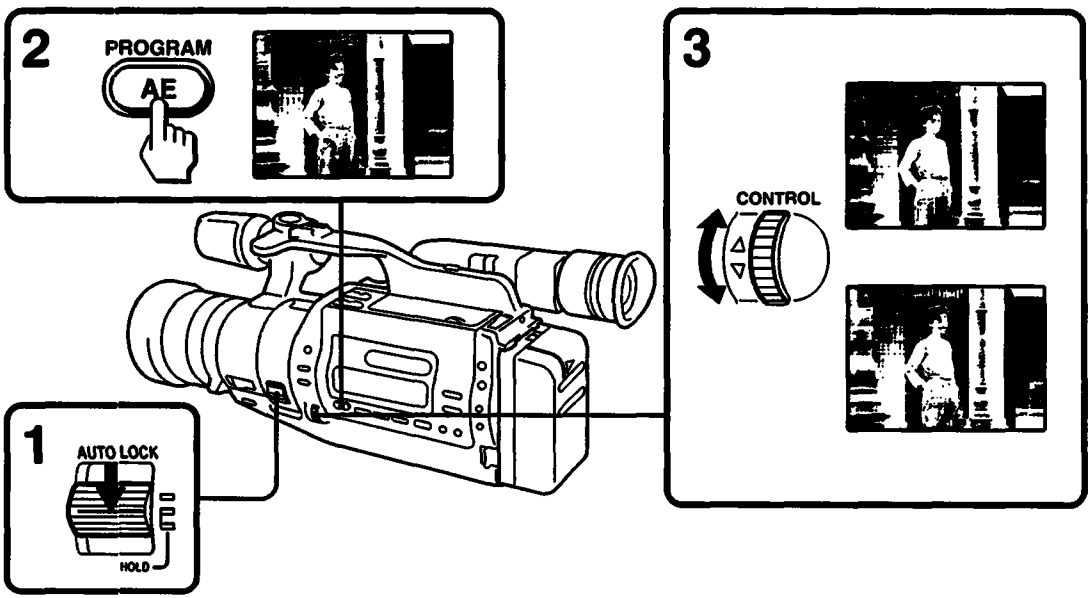

**Theory of the sports mode**

When you select a faster shutter speed, you can record high-speed action clearly compared with picture recorded in automatic mode. However, the picture may become dark when the lighting condition is insufficient. In sports mode, the faster shutter speed is controlled depending on the shooting situation (between 1/60 and 1/500) to maintain the appropriate exposure.



# Using the Aperture Priority Mode

You can select the aperture to determine the desired depth of field. The shutter speed is automatically set (between 1/60 and 1/2000) in combination with the aperture value to maintain appropriate exposure. (1) Slide the AUTO LOCK switch down to the center position. (2) Press PROGRAM AE repeatedly so that AE A appears in the viewfinder. (3) Turn the CONTROL dial to select the desired aperture value. You can select from 12 values: F1.6, F2, F2.4, F2.8, F3.4, F4, F4.8, F5.6, F6.8, F8, F9.6, F11. For a smaller aperture, select a higher value. The shutter speed changes in accordance with the selected aperture value.




**About the depth of field**

The depth of field is the in-focus range, measured from the distance behind a subject to the distance in front. The depth of field can vary with the aperture value and the focal length. Lowering the F value (larger aperture) reduces the depth of field. Raising the F value (smaller aperture) provides a larger depth of field. Zooming in telephoto position offers a smaller depth of field while the depth of field in wide-angle position is greater.

**Note on selection of the aperture**

A flashing ► indicator in the viewfinder indicates insufficient or excessive lighting condition for the aperture priority mode. Although it is possible to record when this happens, we recommend resetting the aperture.

- Insufficient light (the picture in the viewfinder is dark).
  Select a lower value.
- Excessive light (the picture in the viewfinder is too bright).
  Select a higher value.

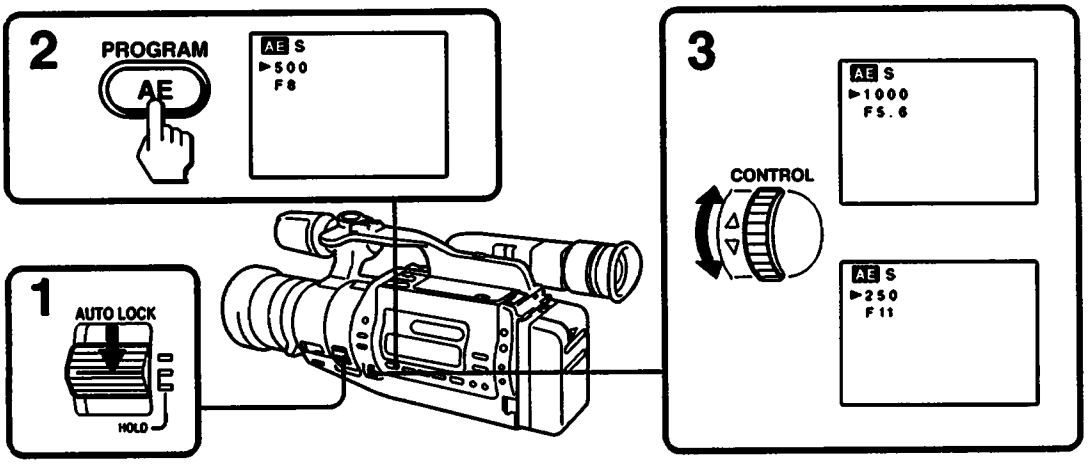
While the ► indicator is flashing, you cannot use the one-push white balance mode (p.38). Operate before adjusting with the CONTROL dial or select the value so that the indicator does not flash.

# Using the Shutter Priority Mode

You can select the shutter speed from 16 speeds between 1/60 and 1/10000. When you select a faster shutter speed, movement appears clearer with less shaking when the tape is played back in still or slow mode. The aperture value is automatically adjusted according to the selected shutter speed to maintain appropriate exposure (between F1.6 and F11). This mode is most effective in the following cases:

- A golf swing or a tennis match in fine weather with the ball movement captured clearly.
- Playing back certain scenes with high-speed movements in clear, sharp pictures.

(1) Slide the AUTO LOCK switch down to the center position. (2) Press PROGRAM AE repeatedly so that AE S appears in the viewfinder. (3) Turn the CONTROL dial to select the desired shutter speed. You can select from 16 speeds: 1/60, 1/90, 1/100, 1/125, 1/180, 1/250, 1/350, 1/500, 1/725, 1/1000, 1/1500, 1/2000, 1/3000, 1/4000, 1/6000, 1/10000. For a faster shutter speed, select a larger value indicator in the viewfinder. The aperture value changes in accordance with the selected shutter speed.




## To Select the Best Shutter Speed

| Example | Shutter speed |
|---|---|
| • A golf swing or tennis match in fine weather (to view the hit ball clearly in still picture mode, set to 1/1000 to 1/4000) | 1/725, 1/1000 |
| • A landscape shot from a moving car<br>• A moving roller coaster in overcast days<br>• An athletic scene, marathon, etc. | 1/125 – 1/500 |
| • Indoor sports<br>• Replacement for the ND2 filter (to halve the exposure) | 1/100 |
| • In sunny weather (to avoid an out-of-focus picture due to a small aperture) | 1/90 |

**Shutter speed indicator in the viewfinder**
For example, the 1/100 shutter speed is displayed as "100" in the viewfinder.

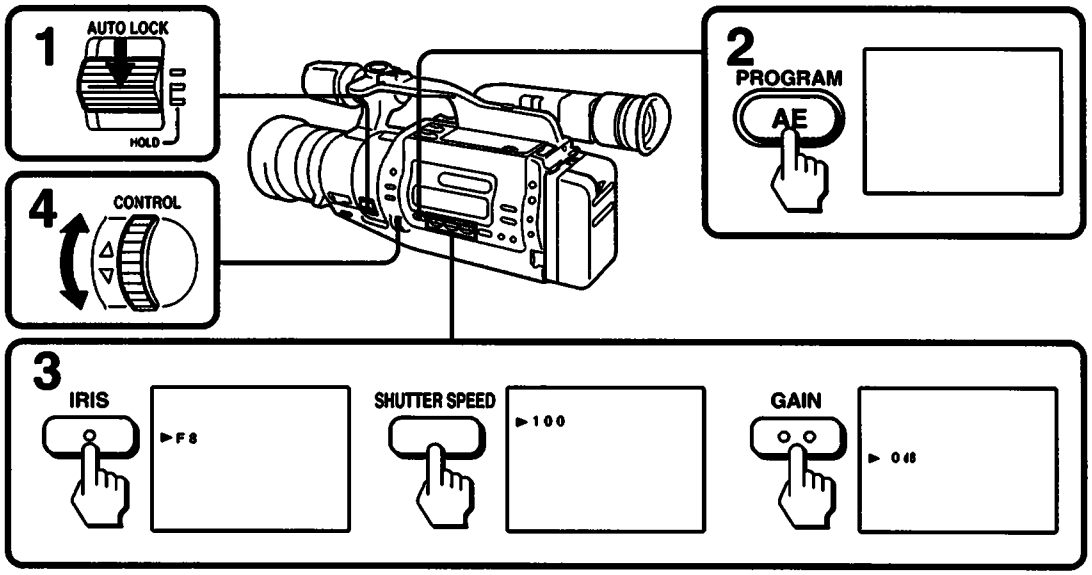
**Note on selection of the shutter speed**
A flashing ▶ indicator in the viewfinder indicates insufficient or excessive lighting condition for the shutter priority mode. Although it is possible to record when this happens, we recommend resetting the shutter speed with the CONTROL dial.

**Shoot at the shutter speed of 1/250 or faster**
We recommend shooting in sunlight or using a video light.

**Note**
When shooting a very bright subject, a vertical band (smear) may appear on the screen if the shutter speed is set too high.

# Using Manual Mode

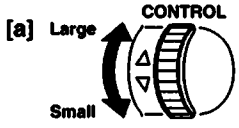
In manual mode, you can adjust the aperture, shutter speed and gain independently. (1) Slide the AUTO LOCK switch down to the center position. (2) If any of the PROGRAM AE indicators is displayed, press PROGRAM AE repeatedly so that no indicator appears in the viewfinder. (3) Press IRIS, SHUTTER SPEED or GAIN. (4) Turn the CONTROL dial to adjust the aperture, shutter speed or gain.

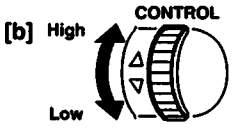


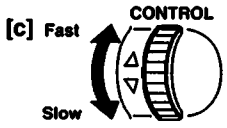

**Adjusting the aperture**
When you press IRIS, the aperture is locked at the value which was selected automatically at that time. You can now select the aperture manually from 13 values using the CONTROL dial: F1.6, F2, F2.4, F2.8, F3.4, F4, F4.8, F5.6, F6.8, F8, F9.6, F11, CLOSE. To open the aperture (larger aperture), select a lower value. **[a]**

**Adjusting the GAIN**
When you press GAIN, the gain is locked at the level which was selected automatically at that time. If you adjusted the aperture manually prior to adjusting the gain, the gain level is set according to the aperture setting. You can now select the gain manually from 8 levels using the CONTROL dial: –3 dB, 0 dB, +3 dB, +6 dB, +9 dB, +12 dB, +15 dB, +18 dB.
To increase the gain to brighten the picture, select a higher level. **[b]**

**Adjusting the shutter speed**
When you press SHUTTER SPEED, the shutter speed is locked at the speed which was selected automatically at that time. When you press this button again, the speed is locked at 1/100. Subsequent press of the button locks the speed at 1/1000. You can now select from 16 speeds using the CONTROL dial: 1/60, 1/90, 1/100, 1/125, 1/180, 1/250, 1/350, 1/500, 1/725, 1/1000, 1/1500, 1/2000, 1/3000, 1/4000, 1/6000, 1/10000.
To increase the shutter speed, select a smaller setting (larger value indicator in the viewfinder). **[c]**



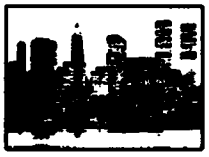




**Note on the shutter speed**
For quick access to the desired speed, first press SHUTTER SPEED to set to the 1/100 or 1/1000 shutter speed (whichever is closer to the desired speed), and then turn the CONTROL dial.

## When to Adjust the Aperture

| Conditions | Turn the CONTROL dial to: |
|---|---|
| When the background is too bright (backlighting) | Open the aperture. (lower value) |
| When the subject is bright with dark background | Close the aperture. (higher value) |

## When to Adjust the Gain

| Conditions | Turn the CONTROL dial to: |
|---|---|
| When recording the darkness faithfully | Lower the gain. (lower level)  |
| When the background is too bright (backlighting) | Increase the gain. (higher level) |

**Note on gain level**
When you select a gain level that is too high, the picture may be distorted.

## To Lock the Manual Settings

To prevent settings from being erased by an accidental pressing of a button, the aperture, gain, shutter speed and white balance can be locked at the levels you set. Sliding the AUTO LOCK switch down to HOLD will disable the IRIS, GAIN, SHUTTER SPEED and WHT BAL buttons and the CONTROL dial.

## To Return to Automatic Adjustment Mode

Slide the AUTO LOCK switch up to the topmost position. All the items will be adjusted in automatic mode.

## To Change the Setting

**To change an item with the ► indicator in the viewfinder**

Turn the CONTROL dial to change to the desired setting.

**To change an item without the ► indicator in the viewfinder**

(1) Press the button of the item to be changed. The ► indicator moves to that item. (2) Turn the CONTROL dial to change to the desired setting.

## To Cancel the Setting

***To cancel the setting of an item with the ► indicator in the viewfinder [a]***

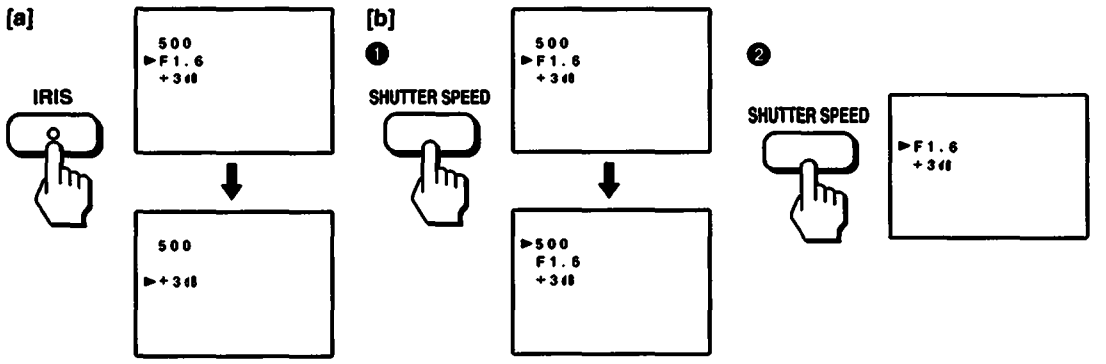
Press the button of the item to be cancelled. The indicator of the item disappears from the viewfinder.

**To cancel the setting of an item without the ► indicator in the viewfinder [b]**

❶ Press the button of the item to be cancelled. The ► indicator moves to that item. ❷ Press the same button again. The indicator of the item diappears from the viewfinder.

**When the settings are cancelled:**

- When the ND SHUTTER is set to AUTO in the menu system, the shutter speed is locked at the range from 1/60 to 1/250.
  When the ND SHUTTER is set to OFF, it is locked at 1/60.
- The automatic aperture mode is resumed.
- The automatic gain mode is resumed. If the aperture value is displayed in the viewfinder, the gain is set to the corresponding level for maintaining the appropriate exposure.



## Advanced Applications of the Manual Mode

The manual mode features an advanced recording technique by controlling the exposure with a combination of adjustments of the shutter speed, aperture value and gain level.

**Understanding the relationship between the exposure and the aperture, shutter speed and gain**
Exposure is measured in EV (exposure value). The exposure value can be varied or maintained at a constant level by controlling the aperture, gain and shutter speed.
The variation of exposure in each item is as follows:

| Item | Selectable steps | Variation of exposure | Brighter ↔ Darker (+EV) (–EV) |
|---|---|---|---|
| Aperture | 13 steps | 0.5EV/step | F1.6 ↔ F11(CLOSE) |
| Shutter | 16 steps | 0.5EV/step | 1/60 ↔ 1/10000 |
| Gain | 8 steps | 0.5EV/step | +18 dB ↔ –3 dB |

The relationship between the exposure and the aperture, shutter speed and gain is:

| EV(Exposure value) = | EV from aperture control | + | EV from shutter speed control | + | EV from gain control |
|---|---|---|---|---|---|

### Example: To create a desired picture without changing the exposure

You can make a desired recording by adjusting the aperture, shutter speed, and/or gain in manual mode.

**1** **Slide the AUTO LOCK switch down to the center position.**

**2** **Press PROGRAM AE repeatedly so that no indicator appears in the viewfinder (if any of the PROGRAM AE indicators is displayed).**

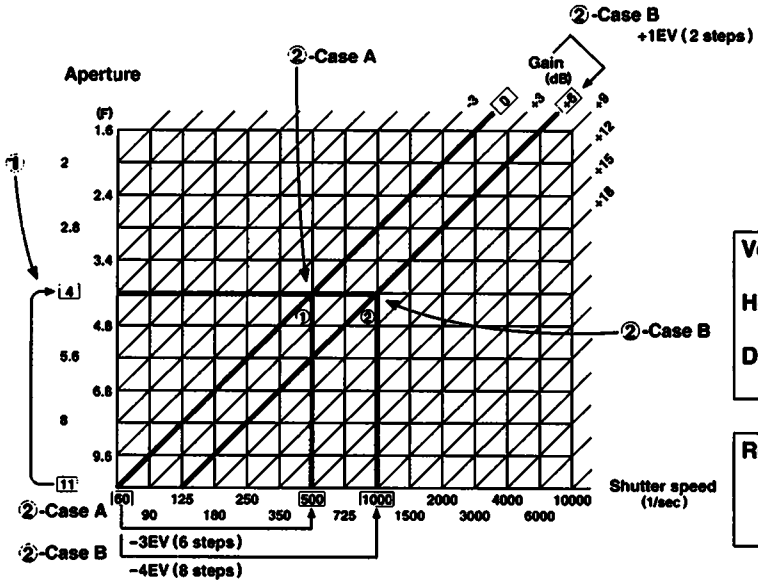
**3** **Press IRIS and GAIN.**

The shutter speed is locked between 1/60 and 1/250. Suppose the aperture value is set to F11 and the gain level to 0 dB.
These settings are used as the reference to determine the exposure setting. The exposure value in this example is 0 EV.

| 0EV = | EV from aperture control | + | EV from shutter speed control | + | EV from gain control |
|---|---|---|---|---|---|

Even if any of the items is changed, the total exposure should be constant (in this example, 0EV).

**4** **Use the following graph to select the setting.**




**Vertical axis:** Aperture value in 0.5EV/step
**Horizontal axis:** Shutter speed in 0.5EV/step
**Diagonal axis:** Gain level in 0.5EV/step

**Reference values**
Aperture value: F11
Shutter speed: 1/60
Gain level: 0 dB

**Example: Change the aperture value to F4 without changing the exposure**

① **Press IRIS and use the CONTROL dial to set the aperture value to F4.**
When the aperture is changed from F11 to F4 (reducing the F value 6 steps), the exposure becomes +3 EV brighter.
To maintain total exposure at 0 EV by the combination of aperture, shutter speed, and gain, the EV from the shutter speed and gain control should be changed to get –3 EV.

② **Case A: To change only the shutter speed**
To reduce the exposure by –3 EV using the shutter speed, you should increase the speed 6 steps. The following calculation shows that you need to change the speed from 1/60 to 1/500.

| 0 EV = | EV variation from Aperture control | + | EV variation from shutter speed control |
|---|---|---|---|
| | + 3 EV | | – 3 EV |
| | F11 to F4 | | 1/60 to 1/500 |

**Press SHUTTER SPEED twice and turn the CONTROL dial to set the shutter speed to 1/500.**

**Case B: To set the shutter speed to 1/1000 and change the gain level**
When the shutter speed is changed from 1/60 to 1/1000, the EV from the shutter speed control changes to –4 EV. To maintain total exposure at 0 EV, +1EV (2 steps) should be added by increasing the gain level. The following calculation shows that you need to change the shutter speed from 1/60 to 1/1000 and the gain from 0 dB to +6 dB.

| 0 EV = | EV from aperture control | + | EV from shutter speed control | + | EV from gain control |
|---|---|---|---|---|---|
| | + 3 EV | | – 4 EV | | + 1 EV |
| | F11 to F4 | | 1/60 to 1/1000 | | 0 dB to + 6 dB |

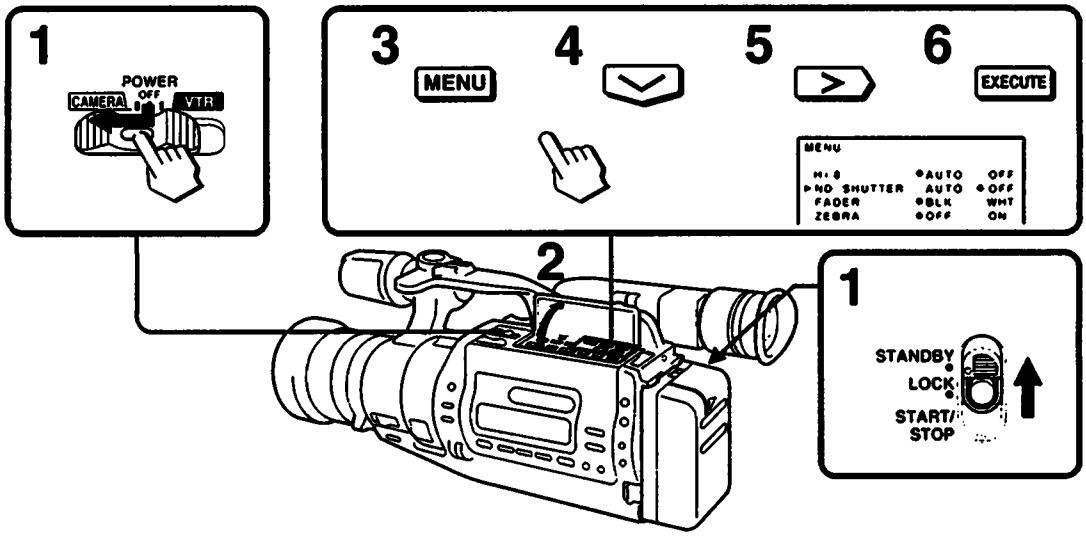
**Press SHUTTER SPEED three times to set the shutter speed to 1/1000, and press GAIN and turn the CONTROL dial to set the gain level to +6 dB.**

## Notes

- When recording outdoors, the brightness of a subject may be affected by weather.
- When recording conditions change, we recommend that you reset each item.
- If you change the setting of the ND FILTER switch, the exposure changes.

## Using an Optional ND (Neutral Density) Filter

The ND shutter feature allows the camcorder to maintain optimum exposure by adjusting the shutter speed automatically between 1/60 and 1/250. Under bright conditions, which disables automatic adjustment of the ND shutter feature, the picture may go out of focus or foreign objects, such as dust on the lens, may be recorded when you use a larger aperture setting. To prevent this, we recommend that you slide the ND FILTER switch in the direction of the arrow so that the ND ON indicator appears in the viewfinder. The internal ND filter is set and reduces the amount of incident light to one-tenth. To remove the ND filter, slide the switch again to turn off the ND ON indicator.
When you use the optional ND filter, we recommend that you set ND SHUTTER to OFF in the menu system to disable the ND shutter feature. (1) Set the camcorder to recording standby mode. (2) Open the lid of the control panel. (3) Press MENU to display the menu. (4) Press ∨ to move the cursor ▶ to ND SHUTTER. (5) Press > to move ● to OFF. (6) Press EXECUTE.

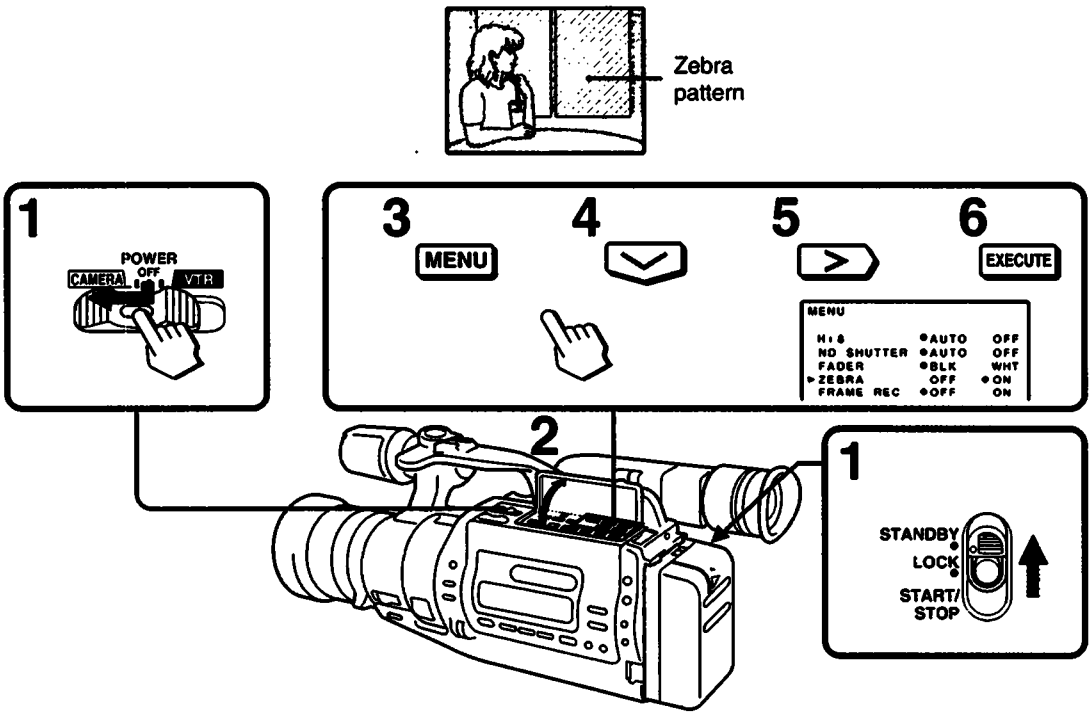



**Note on the ND FILTER switch**
When you are shooting in manual adjustment mode, the ND ON/ND OFF indicator does not appear in the viewfinder. Use the ND FILTER switch as you like, according to shooting conditions. When outdoors, we recommend that you slide the switch so that ND ON appears in the viewfinder. Indoors slide it to turn off the ND ON indicator from the viewfinder.

**Shooting under fluorescent lamp with ND SHUTTER AUTO mode**
The fluorescent lamp may look colored in the playback picture. To avoid this, set ND SHUTTER mode to OFF in the menu system.

## Adjusting Using the Zebra Pattern

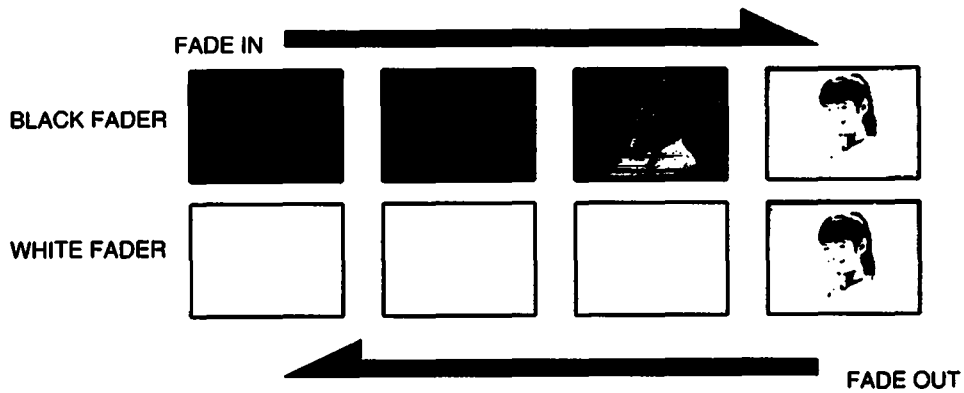
You can set the camcorder to display a zebra pattern (diagonal stripes) in the portion of the picture in the viewfinder with a subject whose brightness exceeds a certain level. The portion of the picture where zebra pattern appears is an area of high brightness and overexposure. You can check the picture level of a subject by displaying the zebra pattern. Use the zebra pattern as a guide for adjusting the aperture, shutter speed, and gain so that you can get the desired picture.
Before you start recording, set ZEBRA to ON using the menu system. (1) Set the camcorder to recording standby mode. (2) Open the lid of the control panel. (3) Press MENU. (4) Press ∨ to move the cursor ▶ to ZEBRA. (5) Press > to move ● and select ON. (6) Press EXECUTE.

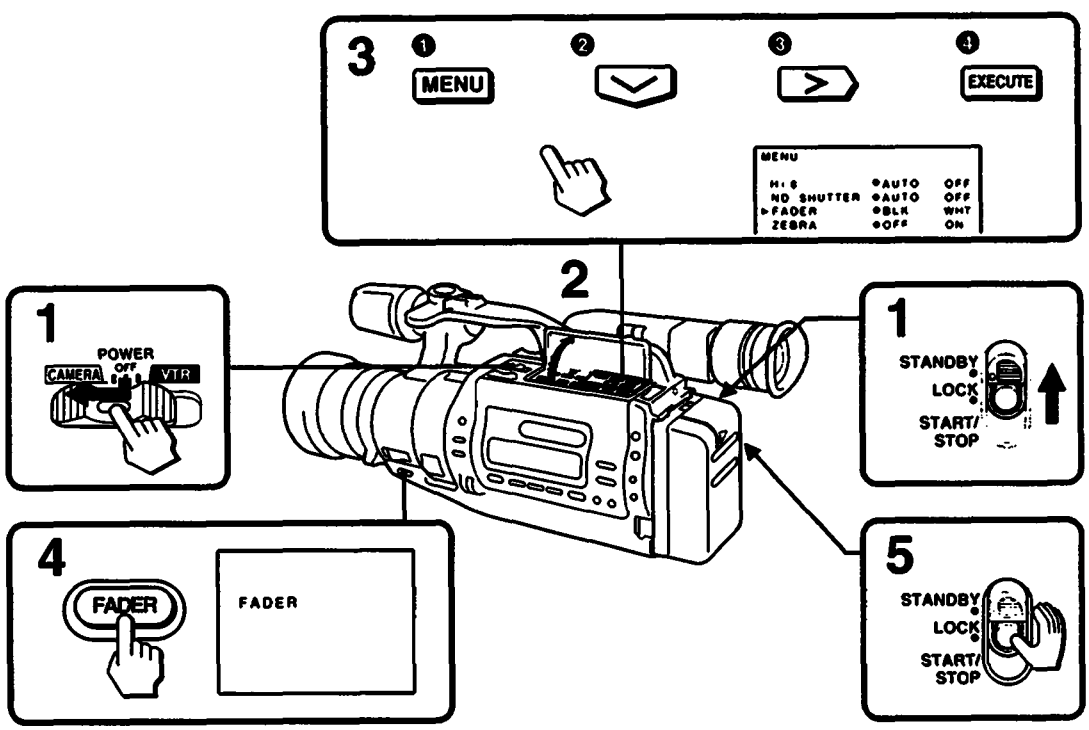



**Note on shooting with a title**
Even if you find the zebra pattern displayed on the title, the zebra pattern is not recorded.

# Fade-in and Fade-out

You can fade the picture and sound in or out to give your recording a professional touch. When fading-in, you can make the picture gradually appear from black or white while increasing the sound. When fading-out, you can make the picture gradually fade to black or white while decreasing the sound. You can select the type of fade (black or white) in the menu system before you start to record. (1) Set the camcorder to recording standby mode. (2) Open the lid of the control panel. (3) Set the FADER mode to BLK (black fade) or WHT (white fade) in the menu system (p.30). (4) Press FADER. The FADER indicator appears. When fading-in, press FADER after sliding the STANDBY switch up to set the camcorder to standby mode. When fading-out, press it while recording. (5) Press START/STOP. When fading-in, the recording starts fading in. When fading-out, the picture fades out and the recording stops.




### To Cancel the Fade-in/fade-out Function

Before pressing START/STOP, press FADER so that the FADER indicator disappears from the viewfinder.

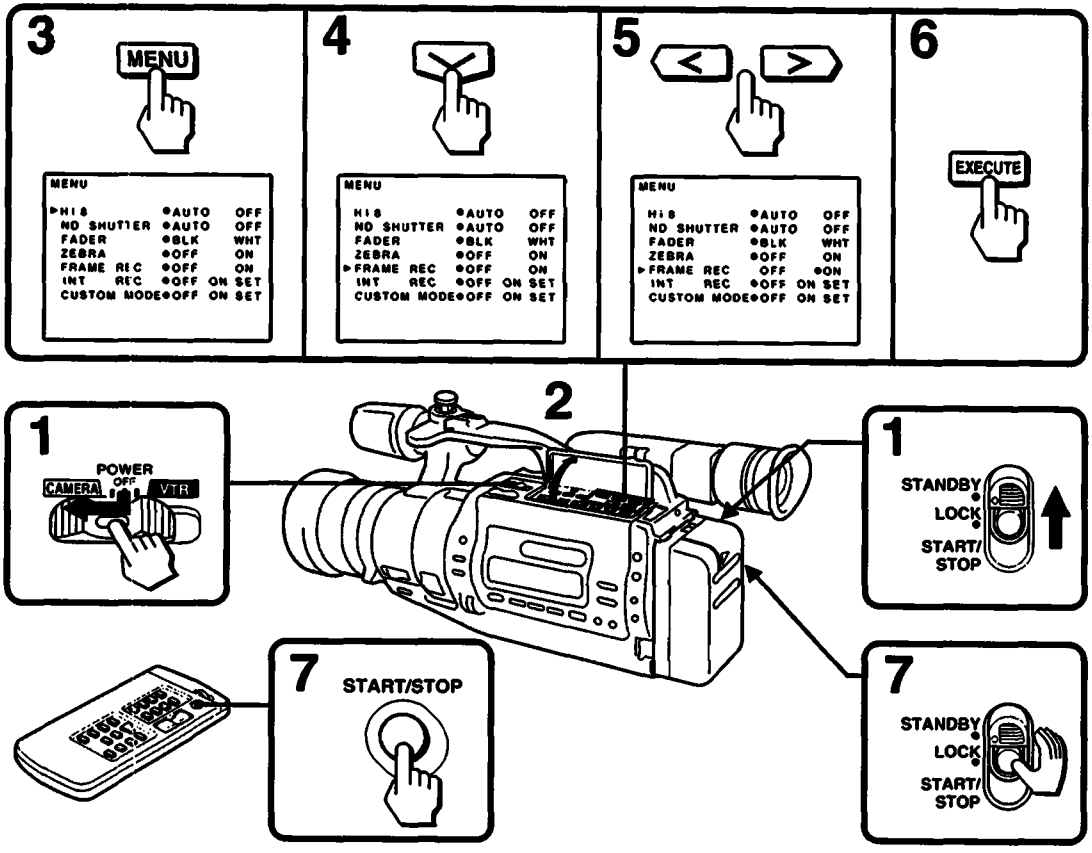
**Notes**

- The date or time does not fade in or out.
- You can make the title fade in or out. (p.57)
- If you want to use the fade-in/fade-out function repeatedly, start from step 1 each time.

# Making the Frame Recording



You can make a recording with an animated effect using frame recording. In frame recording, the camcorder records approx. four frames of a subject and then stops. To create an animated effect, you can then move the subject and then repeat frame recording. Secure the camcorder and use the Remote Commander for effective frame recording. Push REMOTE COMMANDER on the camcorder so that the remote sensor pops up. Before you start recording, set FRAME REC mode to ON in the menu system. (1) Set the camcorder to recording standby mode. (2) Open the lid of the control panel. (3) Press MENU to display the menu. (4) Press v to move the cursor ► and select FRAME REC. (5) Press < or > to move ● and select ON. (6) Press EXECUTE. The setting is stored in memory and the menu disappears. (7) Press START/STOP on the camcorder or the Commander. The camcorder performs a recording of approximately 4 frames, then enters recording standby mode. (8) Move the subject and repeat step 7.




**To cancel the frame recording, you**

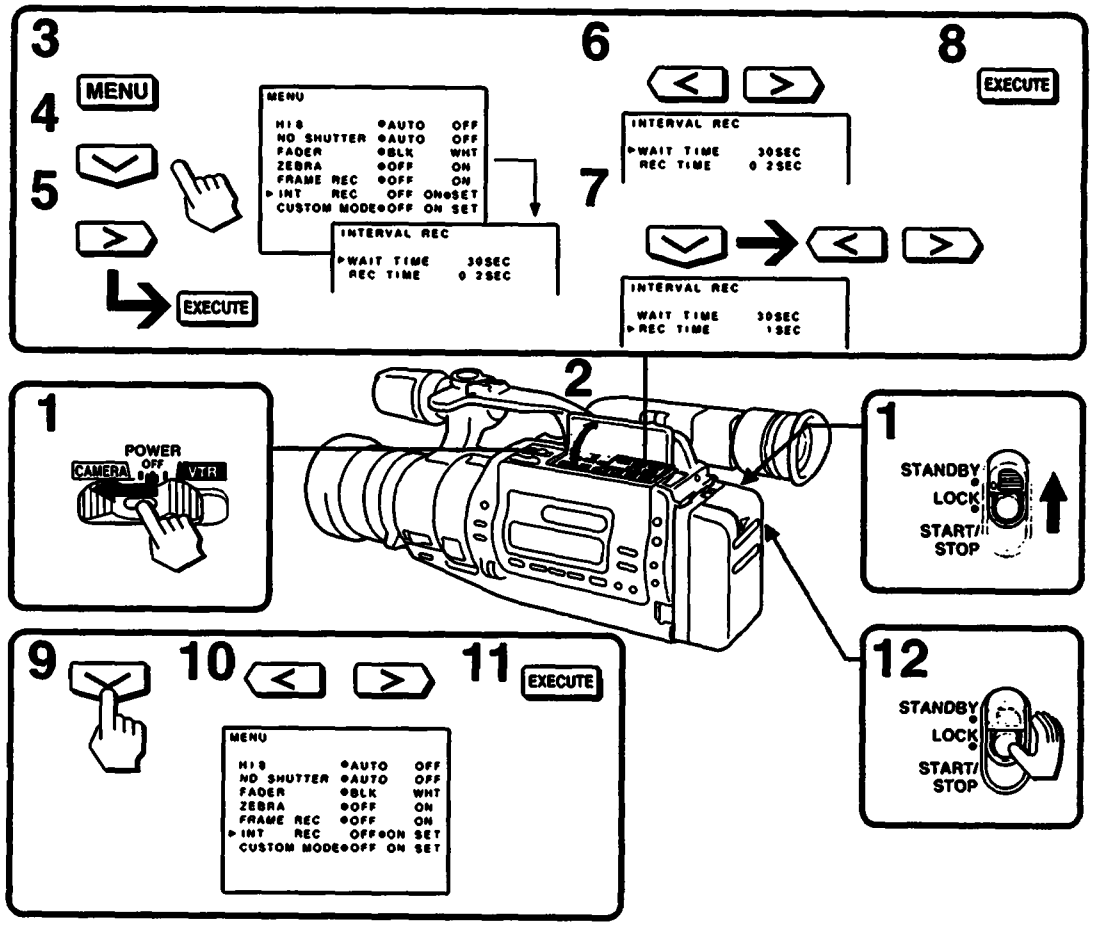
- select FRAME REC OFF in the menu.
- slide the STANDBY switch down to cover START/STOP.
- slide the POWER switch to OFF or VTR.
- detach the power source.

**Note on frame recording using a prerecorded tape**

Two frames of a prerecorded tape immediately after frame recording are completed are erased.

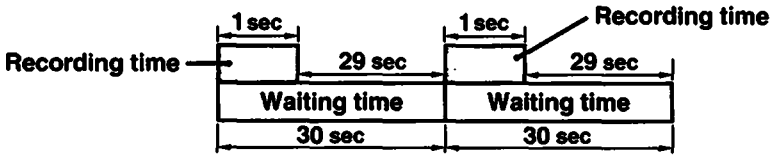
# Interval Recording

You can make a time-lapse recording by setting the camcorder to automatically record and standby sequentially. You can achieve an excellent Hi8 recording for flowering, emergence, etc. with this function. Before you start recording, set the desired recording time and standby (waiting) time in the menu system. (1) Set the camcorder to recording standby mode. (2) Open the lid of the control panel. (3) Press MENU. (4) Press v to select INT REC. (5) Press > to select SET and press EXECUTE. The INTERVAL REC setting menu appears. (6) Press < or > repeatedly so that the desired WAIT TIME (standby period) appears. The time changes: 30 sec→1 min→5 min→10 min. (7) Press v to move the cursor ▶ to REC TIME and select the desired time with < or > as in step 6. The recording time changes: 0.2 sec→0.5 sec→1 sec→2 sec. (8) Press EXECUTE. (9) Press v to select INT REC. (10) Press < or > to select ON. (11) Press EXECUTE. The setting is stored in memory and the menu disappears. (12) Press START/STOP. Recording and standby repeat until the tape reaches the end.



## To Make Interval Recording Precisely

When you select 30 sec. for waiting time and 1 sec. for a recording time, for example, recording repeats for 1 second at the intervals of 29 seconds.




## To Stop Interval Recording before the Tape Ends

Press START/STOP.

**To cancel the interval recording, you**

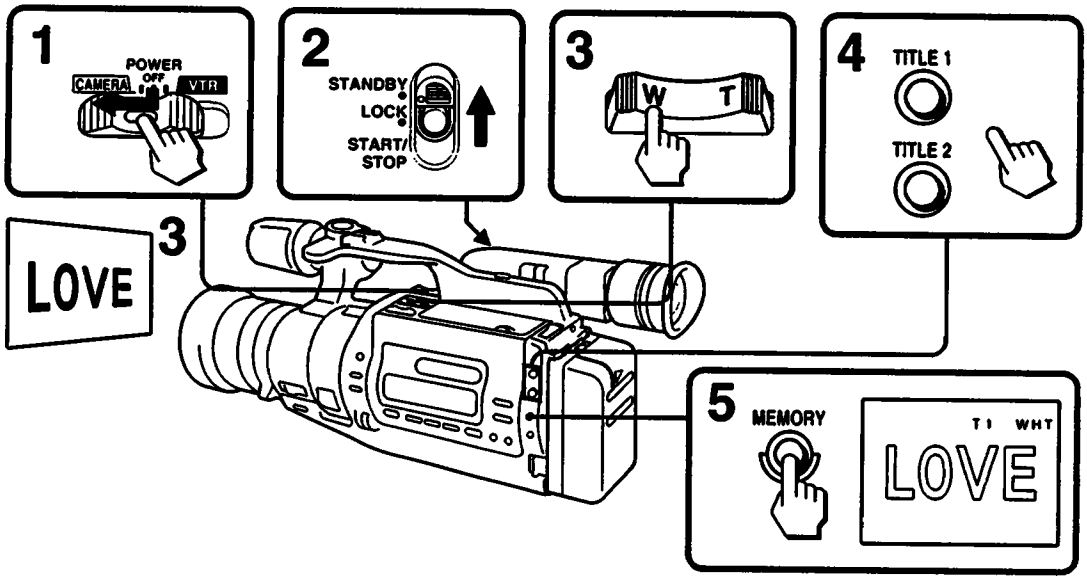
- select INT REC OFF or SET in the menu.
- slide the STANDBY switch down to cover START/STOP.
- slide the POWER switch to OFF or VTR.
- detach the power source.

# Superimposing a Title

You can superimpose your own handwritten message or graphics over the picture during camera recording, playback or editing.

## Storing a Title

You can store up to two titles. Before you store the title, first make a title card. Use a plain, white card and write the title with a dark-colored marker in thick letters. You can also use any available graphics or signs if they are thick enough and have contrast. When lighting conditions are too bright and the title cannot be viewed clearly in the viewfinder, adjust the brightness to a little darker. Before you begin, make sure that the lithium battery is installed. (1) While pressing the small green button on the POWER switch, slide it to CAMERA. (2) Slide the STANDBY switch up. (3) Point the camcorder at the title card and adjust the focus. (4) Press TITLE 1 or TITLE 2. (5) Press MEMORY. The title is stored in the button you pressed in step 4.




### To Check the Title

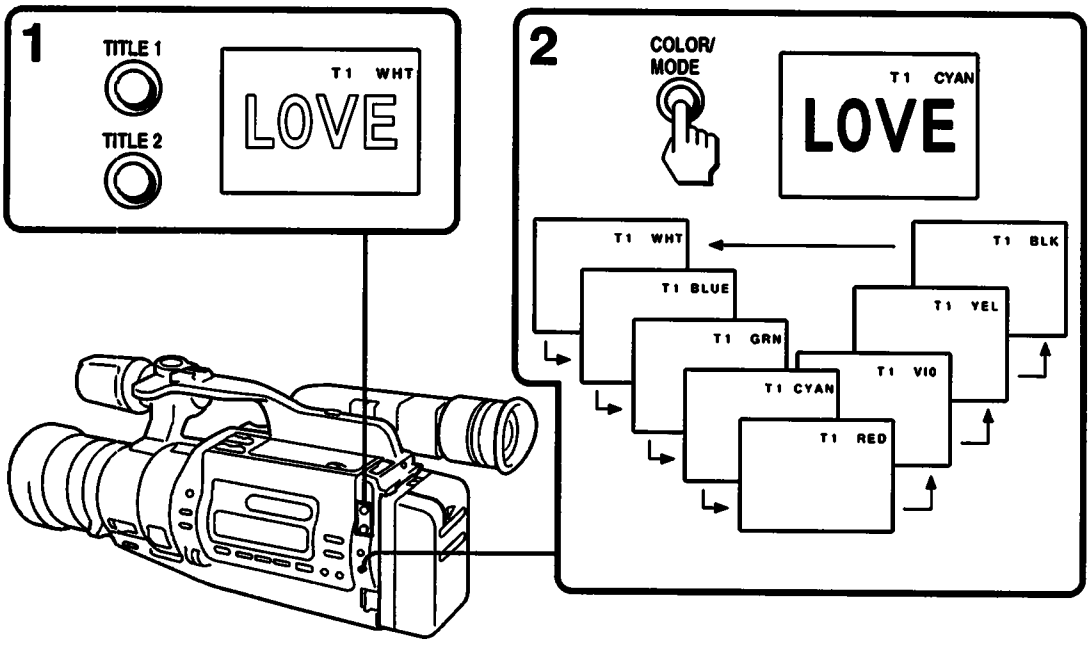
Press TITLE 1 or TITLE 2 (whichever you pressed in step 4) in standby mode. To erase the title from the viewfinder, press the same button again.

**Note on shooting a title**

When a cassette is inserted, the camcorder turns off automatically after five minutes. If more than five minutes are necessary to store the title, take the cassette out.

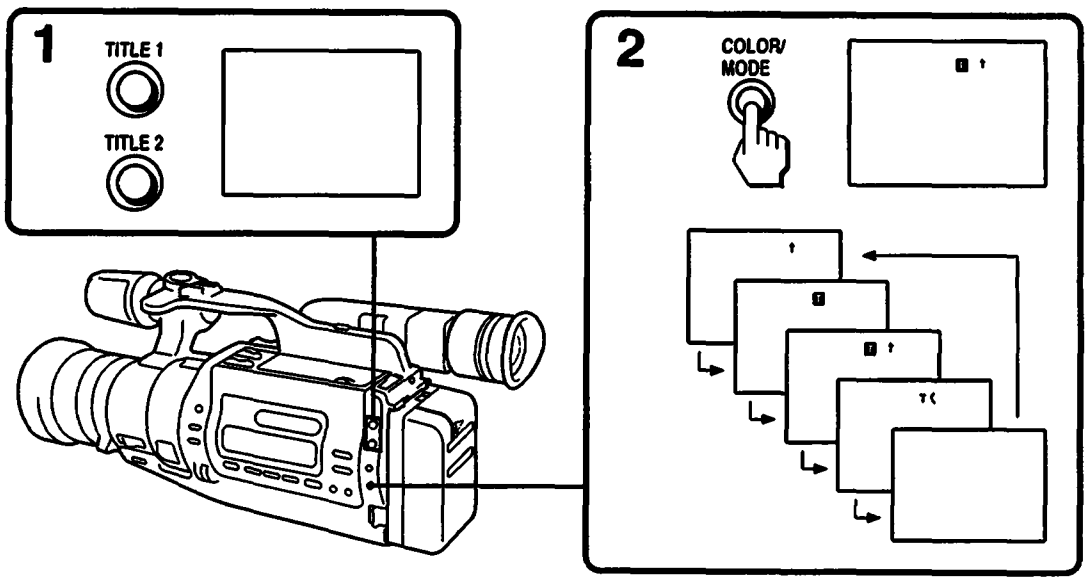
## Selecting the Color of the Title

When the title is displayed in the viewfinder, you can change the title color by pressing COLOR/MODE. (1) If the title is not displayed in the viewfinder, press TITLE 1 (or TITLE 2) to display the title. (2) Press COLOR/MODE and select the title color. Each time you press the button, the color indicator changes: WHT(white)→BLUE→GRN(green)→CYAN→RED→VIO(violet)→ YEL(yellow)→BLK(black), cyclically.



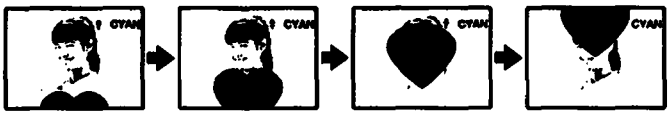
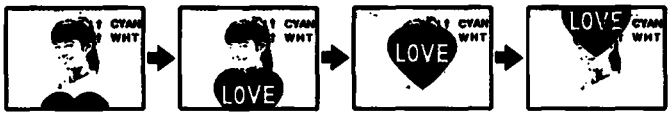
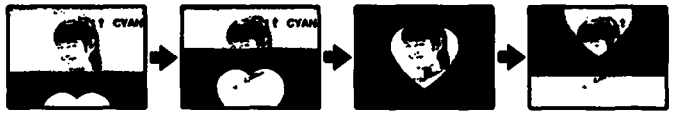
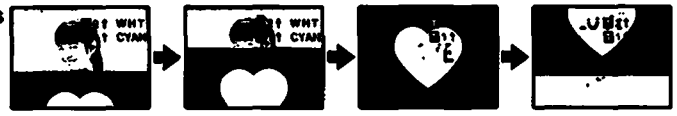
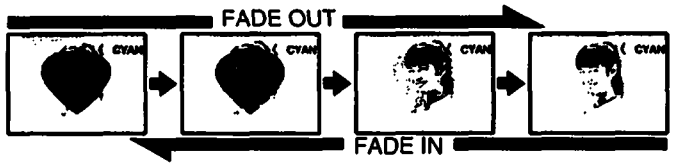
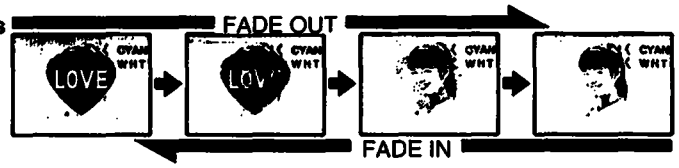
## Selecting the Display Mode of the Title

You can scroll up, reverse and fade-in or fade-out your title. When the title is not displayed in the viewfinder, you can select the display mode by pressing COLOR/MODE. (1) If the title is displayed in the viewfinder, press TITLE 1 (or TITLE 2) to erase the title. (2) Press COLOR/MODE and select the desired display mode. Each time you press the button, the mode indicator changes: ↑ (scrolling) → T (reverse)→ T ↑ (scrolling a reversed title)→ T < (fade-in/fade-out)→ no indicator (normal display).



## Various Display Modes

You can also display two titles at the same time with one title layered on the other (p.58). When you select scrolling mode, the title scrolls up and stops at the center.

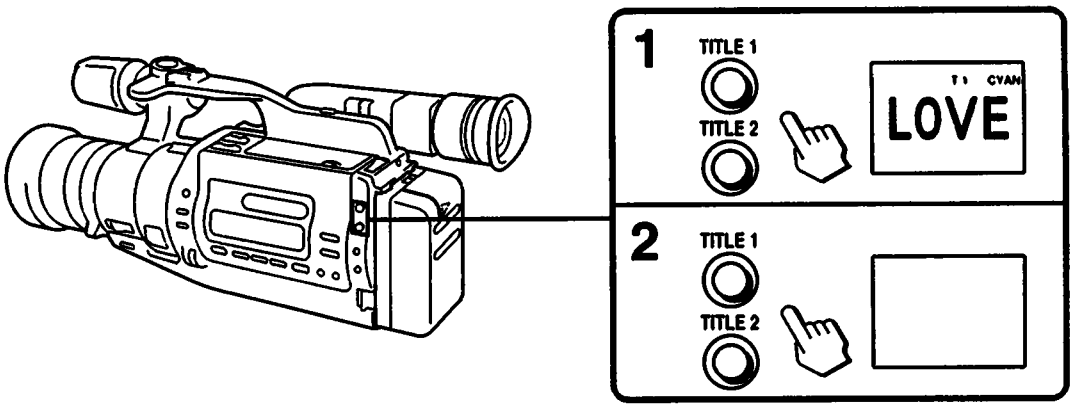
| Display mode (Indicator inside the viewfinder) | |
|---|---|
| **Normal display mode (no indicator)** | 1 title <br>2 titles |
| **Scrolling up the title (↑)** | 1 title  <br>2 titles  |
| **Reversing the title with the picture (T)** | 1 title<br>2 titles |
| **Scrolling up the reversed title (T↑)** | 1 title  <br>2 titles  |
| **Fade-in or fade-out the title (T<)** | 1 title  <br>2 titles  |

## To Check the Display Mode

Press TITLE 1 (or TITLE 2). Press the same button again to erase the mode indicator.

## Superimposing a Title

When you superimpose a title, the color and display mode indicators inside the viewfinder are not recorded. Before superimposing the title, store it (p.54). (1) During recording or playback, press TITLE 1 or TITLE 2 at the point you want to insert the title. The title appears. When you select scrolling or reversed title scrolling mode, the title scrolls up and stops at the center. (2) Press TITLE 1 or TITLE 2 at the point you want to turn off the title. The title goes out. In scrolling mode, it scrolls up and disappears.




### To Superimpose Two Titles at a Time

You can record with one stored title positioned over the other stored title.

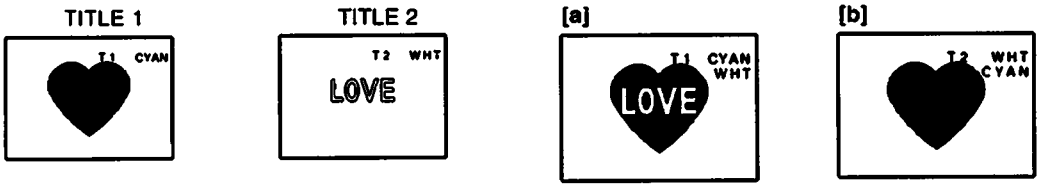
**To put TITLE 2 over TITLE 1 [a]**

In step 1 above, hold down TITLE 1 and press TITLE 2.

**To put TITLE 1 over TITLE 2 [b]**

Hold down TITLE 2 and press TITLE 1.

To turn off the titles, press either TITLE 1 or TITLE 2.




### To Superimpose a Title at the Beginning

1 Set the camcorder to standby mode.
2 Press TITLE 1 or TITLE 2.
3 Press START/STOP to start recording with the title displayed inside the viewfinder.
4 At the point you want to turn off the title, press TITLE 1 or TITLE 2.

**Superimposing with the scrolling mode**

If you do not want a title to stop at the center, press TITLE 1 (or TITLE 2) twice at the point you want to insert the title.

**About the Title Color**

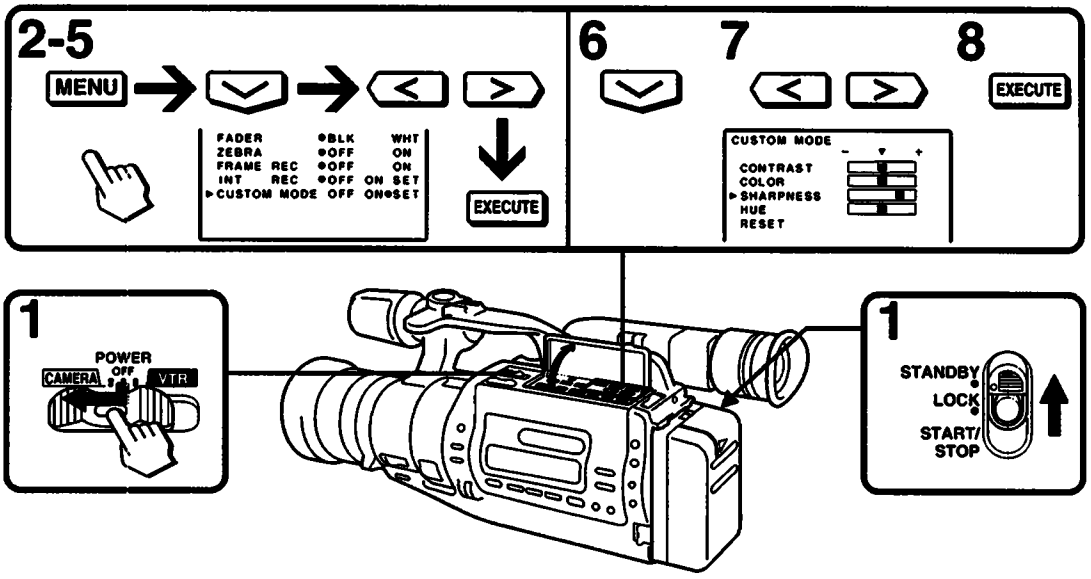
You can change the title color even after displaying the title in the viewfinder by pressing COLOR/MODE. When displaying two titles, you can change the color of the title displayed on the upside. To change the color of the title displayed on the downside, erase the title once, then display the title on the downside and change the color.

**Note on scrolling and fade-in/fade-out mode**

You cannot use these display modes in still, frame-by-frame or slow playback modes.

# Recording with Custom Preset Function

You can preset the camcorder to record the picture with the desired contrast, color, sharpness and hue. Adjust the camcorder, if necessary, after making several trial recordings.
When presetting, adjust the picture by shooting a subject and checking the picture displayed on a TV using the menu system. For connecting a TV, see page 23. Press DISPLAY to display the menu on the TV. (1) Set the camcorder to recording standby mode. (2) Press MENU. (3) Press v to move the cursor ▶ to CUSTOM MODE. (4) Press < or > to move ● to SET. (5) Press EXECUTE. The CUSTOM MODE menu appears. (6) Press v to move ▶ to the item you want to adjust. If ▶ is set to RESET, press v once to move the cursor to the top. (7) Press < or > to adjust the picture while shooting a subject and monitoring it on the TV. You can select three steps each from the standard position. (8) Make sure that the cursor is not set to RESET and press EXECUTE. The CUSTOM MODE menu disappears and the settings are stored in memory.



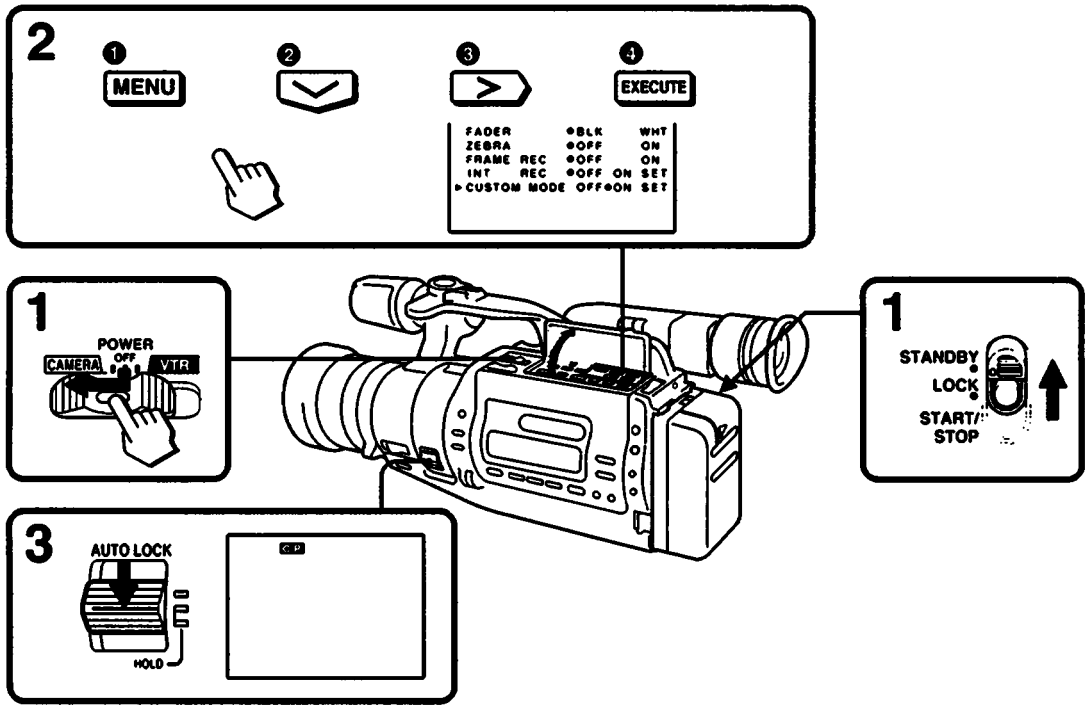

**Items for setting**

| Item | Function | ← − ▼ + → |
|---|---|---|
| CONTRAST | To adjust the brightness | Darker ⟷ Brighter |
| COLOR | To adjust the color intensity | Lighter ⟷ Darker |
| SHARPNESS | To sharpen the outline | Softer ⟷ Sharper |
| HUE | To adjust the hue | Purplish ⟷ Greenish |

**Note on adjustment of each item**
Make sure to shoot the appropriate subject to the item you want to preset.

## Recording with the Custom Preset Function

(1) Set the camcorder to recording standby mode. (2) Set CUSTOM MODE to ON in the menu system. (3) Slide the AUTO LOCK switch down to the center position. The CP indicator appears in the viewfinder.




### About the previous setting

When you slide the AUTO LOCK switch up to the green position after recording, the CP indicator disappears, but the setting is retained.

## To Return to the Standard Setting

Display the CUSTOM MODE menu and move the cursor ▶ to RESET and press EXECUTE. The CUSTOM MODE menu disappears. All of the items will return to the standard position.

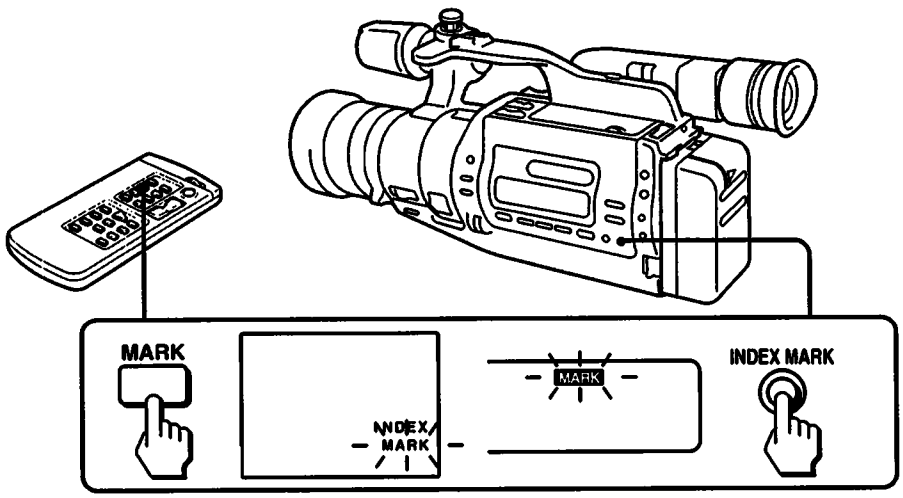
# Using the Index Function

You can locate the beginning of a desired program easily by marking an index signal during recording or playback and searching for it later.

## Marking an Index Signal

You can mark an index signal during recording or playback.
You can also mark it with the Remote Commander. Push REMOTE COMMANDER on the camcorder so that the remote sensor pops up.

**To mark an index signal at the beginning of recording or playback**
Press INDEX MARK on the camcorder or the Commander in recording standby or playback standby mode. The INDEX MARK indicator appears in the viewfinder with the MARK indicator flashing. The MARK indicator flashes in the display window. When recording or playback starts, the MARK indicator stops flashing. This shows that the index signal is being marked. The INDEX MARK indicator will then disappear.



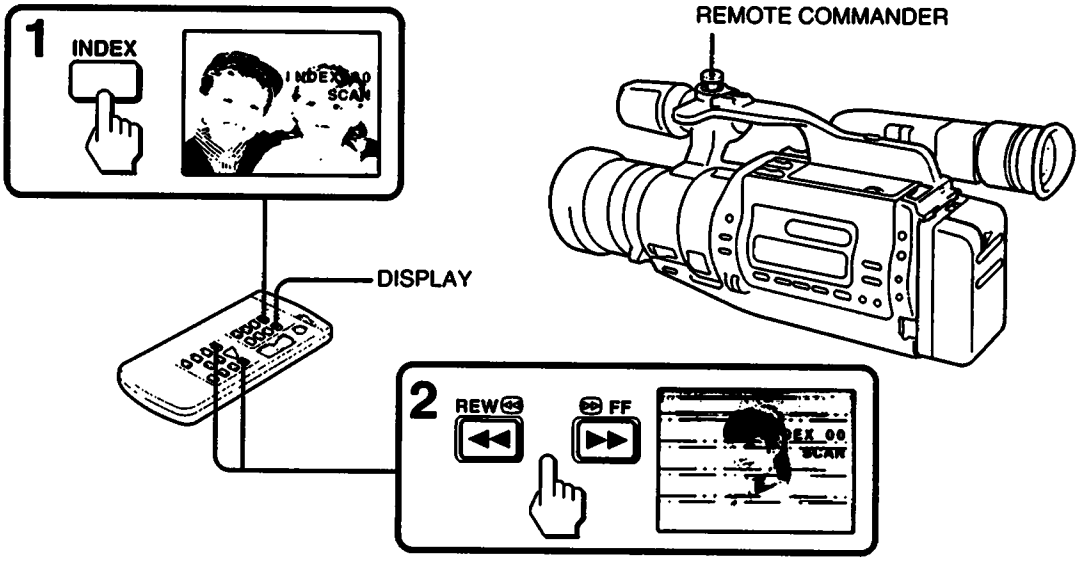

**To mark an index signal during recording or playback**
Press INDEX MARK on the camcorder or the Commander at the point you want to locate later.

**Notes**
- Make sure you mark index signals at more than two-minute intervals. If you mark them at less than within two-minute intervals, you may not be able to search for them correctly.
- While the index signal is being marked (the INDEX MARK indicator lights in the viewfinder), do not stop recording. If you do, the search may not be completed correctly.
- If you mark an index signal on the tape with the data code recorded, the data code will be erased at the point on which the index signal is marked. When playing back this tape, the camcorder keeps displaying the data code immediately before the erased one. If the data code does not exist for more than 30 seconds, the data code displays bars (– – –).

**Note on the tape on which an index signal cannot be marked**
You cannot mark an index signal on a tape with the red mark on the cassette exposed or on a tape recorded in LP mode.

## Scanning the Beginning of Each Program While Monitoring the Playback Picture—Index Scan (1)

Use the Remote Commander. To view the picture on a TV, press DISPLAY. (1) Press INDEX on the Commander during normal playback or playback pause mode. (2) Press ◀◀ or ▶▶. The tape rewinds or advances rapidly and plays back for approximately 10 seconds from the point on which the index signal was marked. If you want to continue playback, press ▷. When you do not press any button, the tape is automatically scanned to the next program.

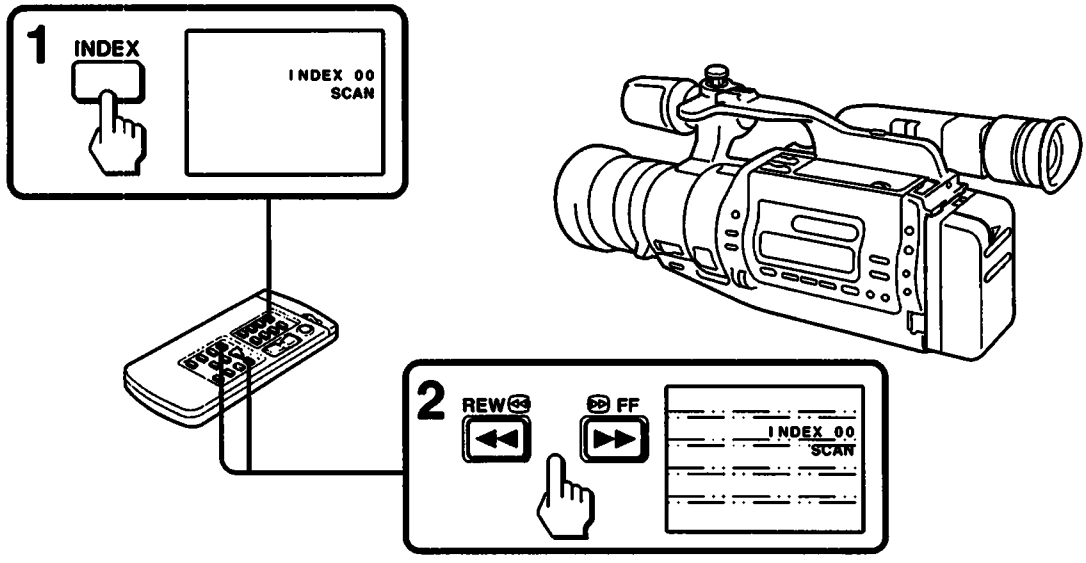



### To Cancel Index Scan Mode

Press ▷. Normal playback resumes.

## Scanning the Beginning of Each Program in Sequence—Index Scan (2)

(1) Press INDEX on the Commander during stop mode. (2) Press ◀◀ or ▶▶. The tape rewinds or advances rapidly and plays back for approximately 10 seconds from the point on which an index signal was marked. (3) Press ▷ when the desired program starts playback.

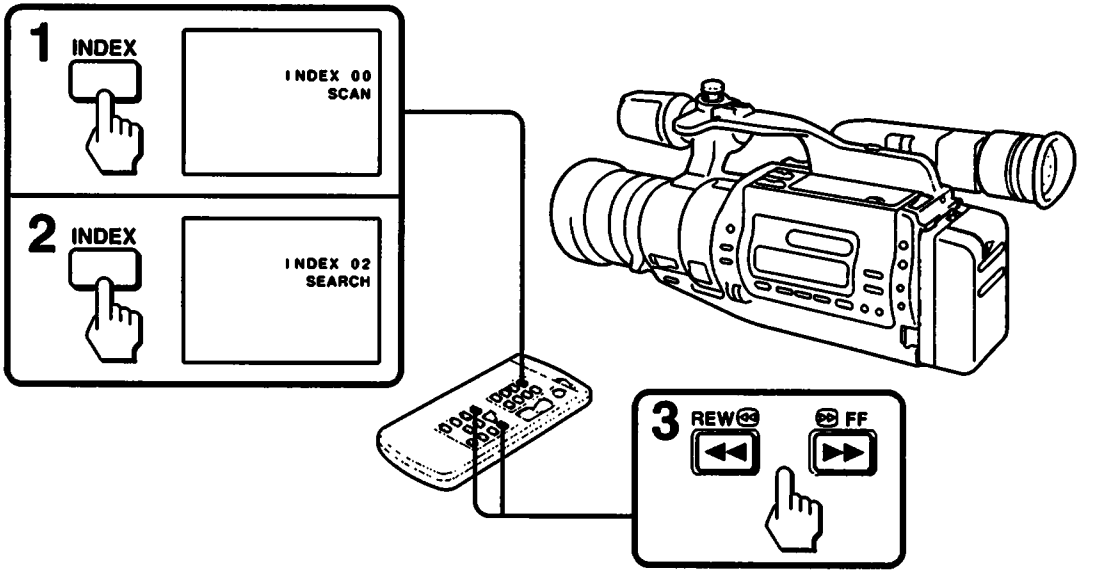



### To Cancel Index Scan Mode

Press ▷. Normal playback resumes.

## Locating the Desired Program—Index Search

(1) Press INDEX on the Commander during stop or playback mode. (2) Press INDEX repeatedly until the index number of the desired program is displayed in the viewfinder. (3) Press ◀◀ or ▶▶. Playback starts from the beginning of the desired program.

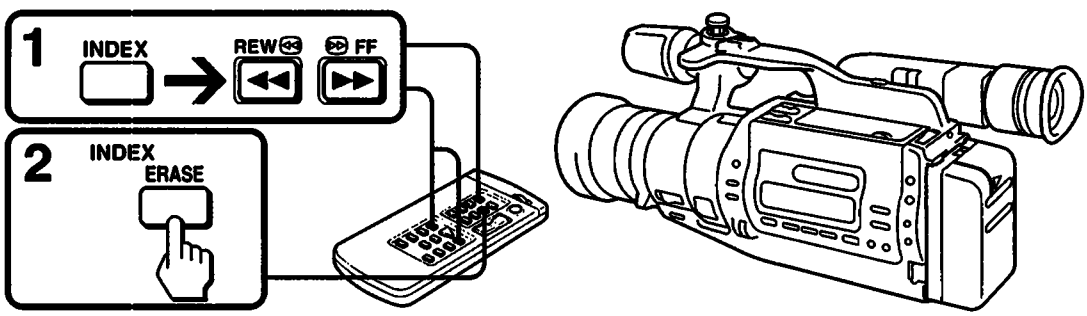



### To Stop Index Search Mode

Press ▷. Normal playback resumes.

## Erasing the Index Signal

(1) Locate the index signal to be erased using the index scan or index search function. (p.62 – 64) (2) Press INDEX ERASE on the Commander within 2 to 10 seconds while the desired program plays back. After the index signal is erased, the camcorder returns to index scan or index search mode, whichever was used in step 1.






**Notes on erasing**

- Press ERASE more than 2 seconds after the playback of the desired program begins.
- You cannot erase the index signal on a tape on which the red mark on the cassette is exposed.
- While the index signal is being erased, the sound cannot be heard and a black band appears at the bottom of the picture. This will not affect the recorded sound or picture.
- The camcorder can detect index signals marked with VCRs, but cannot erase them. VCRs with a index function can detect index signals marked with this camcorder but cannot erase them.
- An index signal may be erased when making PCM after recording in the portion where the index signal is marked.

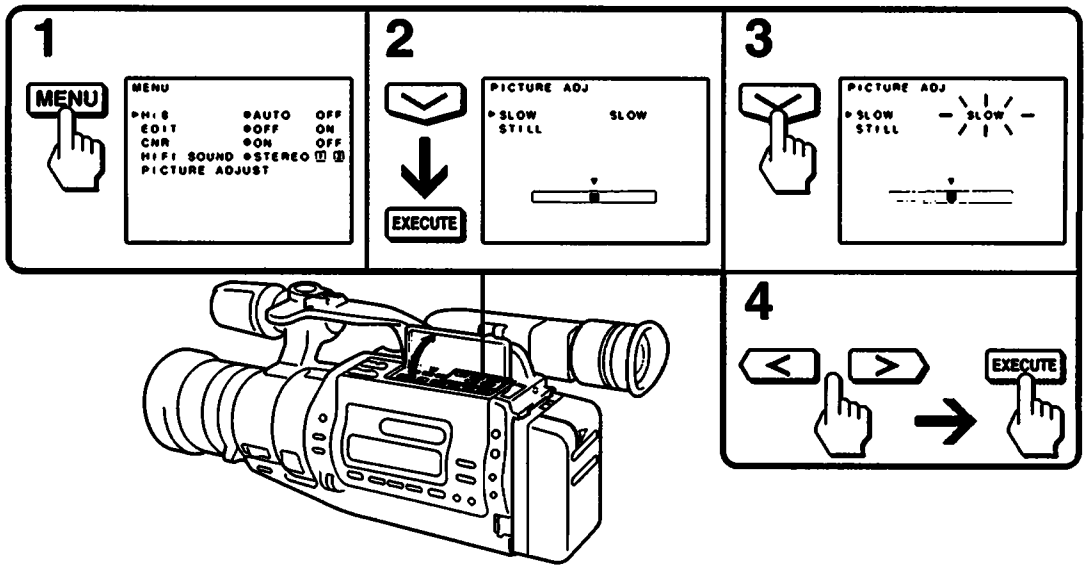
**Note on RC time code and data code**

When an index signal is erased, the RC time code and data code on the same portion of the tape is also erased. Bars (–––––) appear when the portion is played back. To use that tape for editing using an editing controller, rewrite the RC time code (p.69).

# Adjusting the Playback Picture

## Adjusting a Still or Slow Picture

You can adjust the playback picture when noise bands appear at the top or bottom of the picture during slow mode or when vertical shaking occurs during still mode. First display the menu in the viewfinder or on the TV screen. (1) Press MENU. (2) Press ∨ to move the cursor ► to PICTURE ADJUST and press EXECUTE. The PICTURE ADJUST menu appears. (3) Press ∨ to move the cursor ► to the item you want to adjust ("SLOW" or "STILL"). (4) Keep pressing < or > until you get the best picture quality. (5) Press EXECUTE to store the setting and exit the menu.

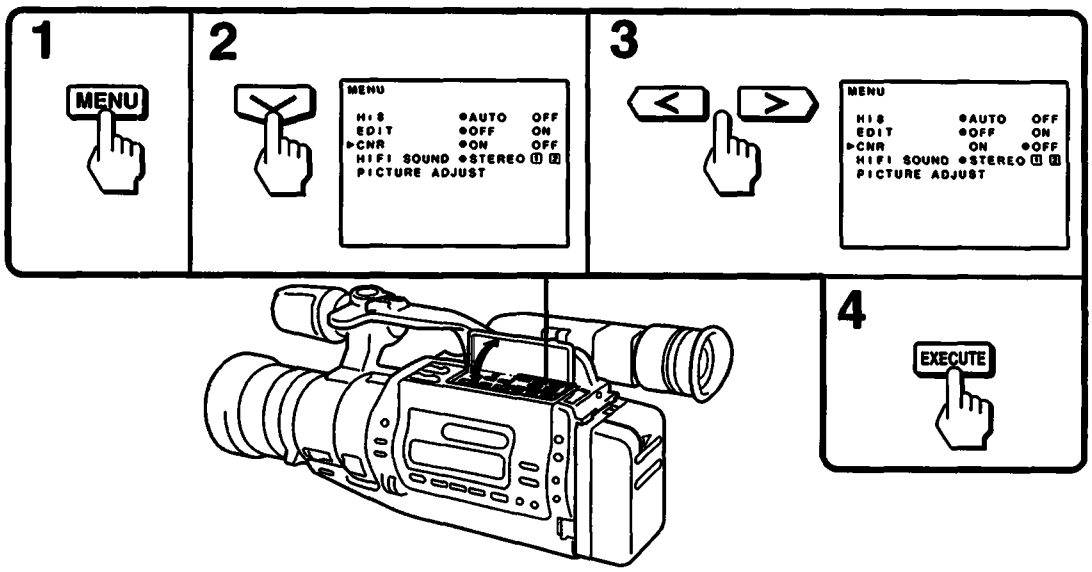



**Note**

When the tape recorded in LP mode is played back, STILL adjustment of the PICTURE ADJUST menu does not function as the still picture is automatically adjusted to minimize the vertical shaking.

## Reducing Color Noise on Playback Picture

The camcorder incorporates Chroma Noise Reduction (CNR) to minimize color noise or irregular colors generated when playing back the tape. This function activates when CNR mode is set to ON in the menu system (it is preset to ON at the factory). However, "color lag" may occur when some pictures are played back with CNR mode turned on. ("Color lag" means remainings of color for moving subjects.) Set CNR mode to OFF if you want to erase color lag even though color noise is not reduced. (1) Press MENU. (2) Press ∨ to move the cursor ▶ to CNR. (3) Press < or > to move ● to OFF. (4) Press EXECUTE to store the setting and exit the menu.

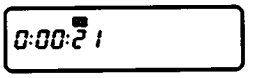


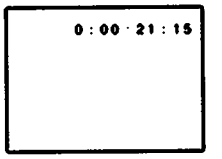
# Using the RC Time Code

The RC time code indicates the absolute position of a tape with hour, minute, second and frame. The code is automatically recorded during camera recording or video recording, and can be displayed in the viewfinder, the display window and the TV screen during playback. You can easily locate a desired program as an accurate tape counter.

## Displaying the RC Time Code during Playback

Press COUNTER/TIME CODE. The RC time code appears in the viewfinder and the display window. The frame numbers are not displayed in the display window. You can also display the RC time code during recording by pressing COUNTER/TIME CODE.




### To Display the RC Time Code on the TV Screen

Press DISPLAY.

**Use of RC time code for editing**

Before you start editing, write the time code from the beginning to the end of the tape. Note that the data code of that tape is erased.

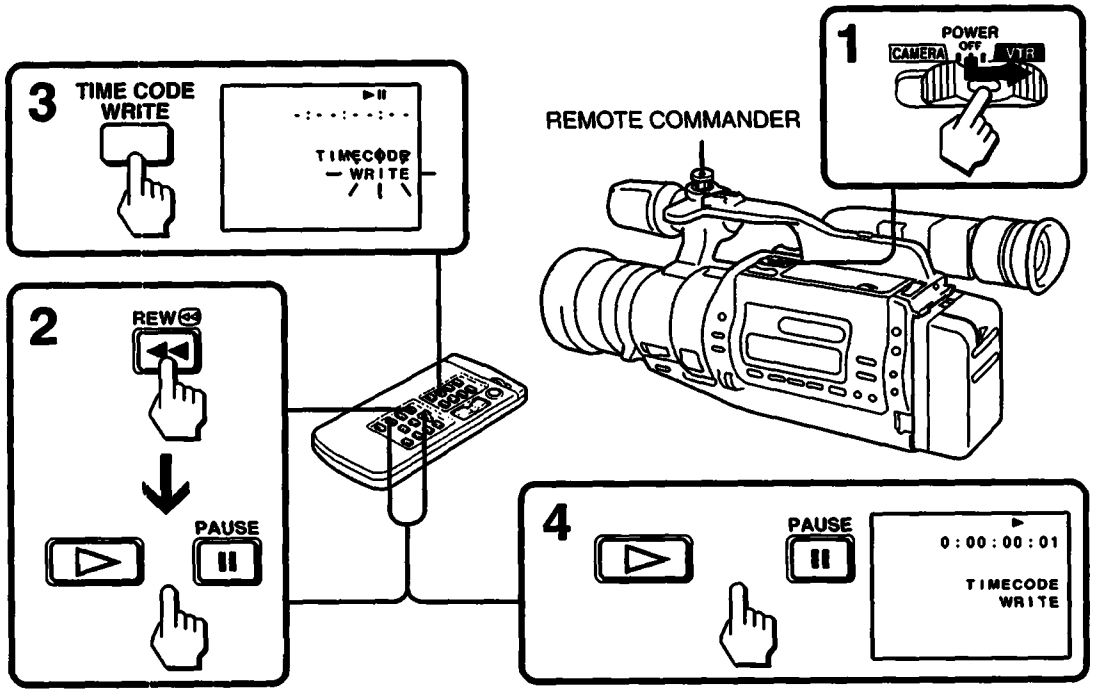
**Notes on the RC time code displayed**

Bars (----) appear in place of the RC time code when you play back:

- a blank portion of the tape.
- a tape in which the RC time code is illegible because of tape damage or noise.
- a tape recorded with a video camera recorder which does not have the RC time code function.
- the portion of a tape where the RC time code was erased together with the index signal.

## Writing the RC Time Code on a Prerecorded Tape

You can write the RC time code on a prerecorded tape. Use the Remote Commander. (1) While pressing the small green button on the POWER switch, slide it to VTR. (2) Rewind the tape to the beginning and set the camcorder to playback pause mode. (3) Press TIME CODE WRITE on the Remote Commander. The TIME CODE WRITE indicator appears in the viewfinder with WRITE flashing. (4) Press ▷ or II to start playback. The WRITE indicator stops flashing and the RC time code writing starts from 0:00:00:00.




### To Stop Writing the RC Time Code

Press □ (or any tape transport button).

### To Write the RC Time Code from the End of the RC Time Code Prerecorded Portion

Rewind the tape to the portion on which the RC time code has been written and set the camcorder to playback pause mode. Then follow steps 3 and 4 above. The RC time code is written continuously.

**Canceling RC time code writing**

The RC time code writing stops when:

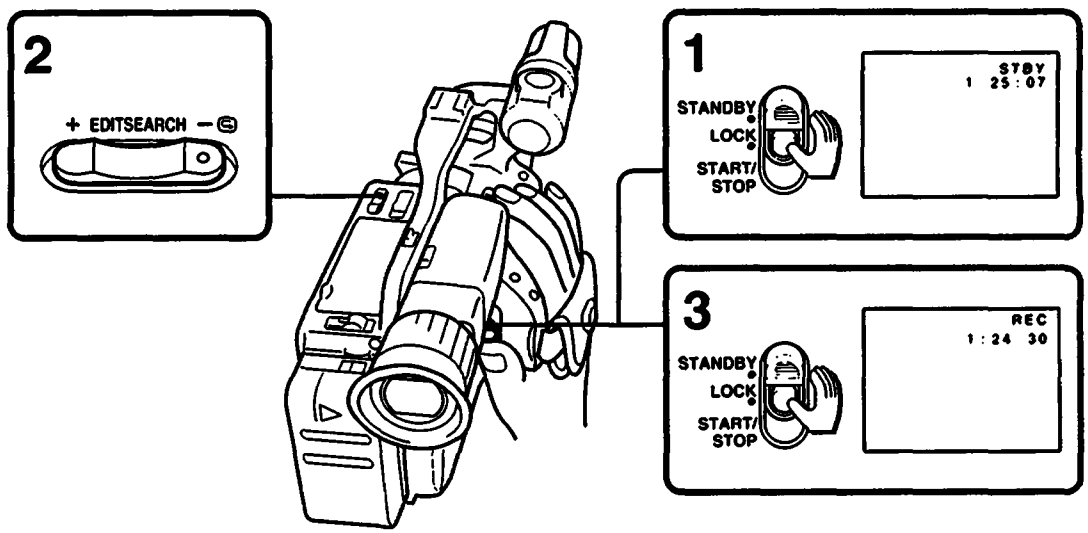
- you press TIME CODE WRITE again before starting playback
- you press INDEX before starting playback
- you change from playback mode to another mode

**Notes on writing the RC time code**

- You cannot write the RC time code on a tape recorded in LP mode. On a tape recorded in mixed LP and SP modes, you can write the RC time code but it may not be displayed correctly when the tape is played back.
- When you are writing the RC time code from the middle of a tape without the time code written, writing starts several frames before the current picture.

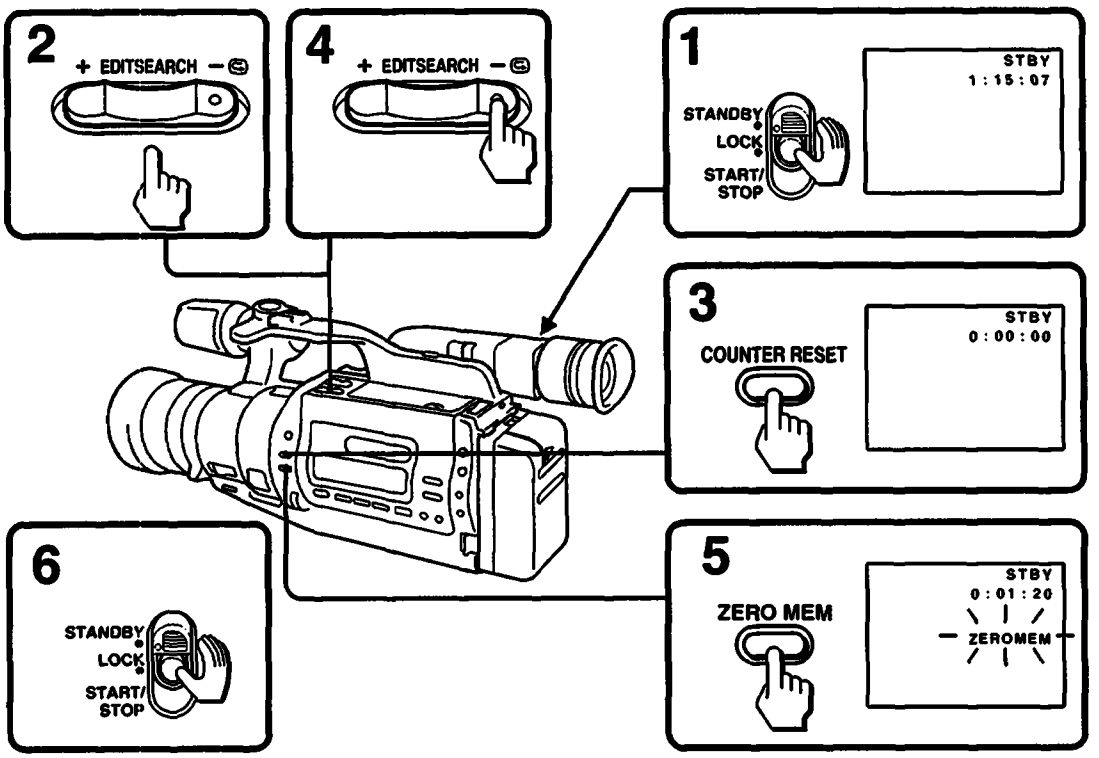
## Re-recording on a Previously Recorded Portion—EDIT SEARCH (1)

During recording, you can review your last recorded portion in the viewfinder and re-record over it using EDITSEARCH. (1) Press START/STOP to set the camcorder to recording standby mode. (2) Keep pressing the + (forward playback) or – (reverse playback) side of EDITSEARCH and release the button when you locate the beginning of the portion you want to record over. The camcorder enters standby mode again. (3) Press START/STOP to begin re-recording. As long as you do not eject the tape, the transition between the scenes will be smooth.



## Re-recording a Picture in the Middle of a Recorded Tape—Insert Recording

You can insert a scene in the middle of a recorded tape by setting the starting and ending points. The previous recorded portion will be erased. If the TC indicator is displayed in the viewfinder, press COUNTER/TIME CODE to erase it and display the tape counter. (1) Press START/STOP to set the camcorder to recording standby mode. (2) Keep pressing the + (forward playback) or – (reverse playback) side of EDITSEARCH, and release the button where you want to end the insertion. The camcorder enters standby mode again. (3) Press COUNTER RESET. The counter resets to zero. (4) Keep pressing the – side of EDITSEARCH and release the button at the point where you want to start the insertion. (5) Press ZERO MEM. The ZERO MEM indicator flashes and the ending point is stored in memory. (6) Press START/STOP. Insert recording begins. The insert recording stops automatically at the counter zero point.




### To Change the End Point

Press ZERO MEM to erase the ZERO MEM indicator, then repeat steps 2 to 5.

**Note**

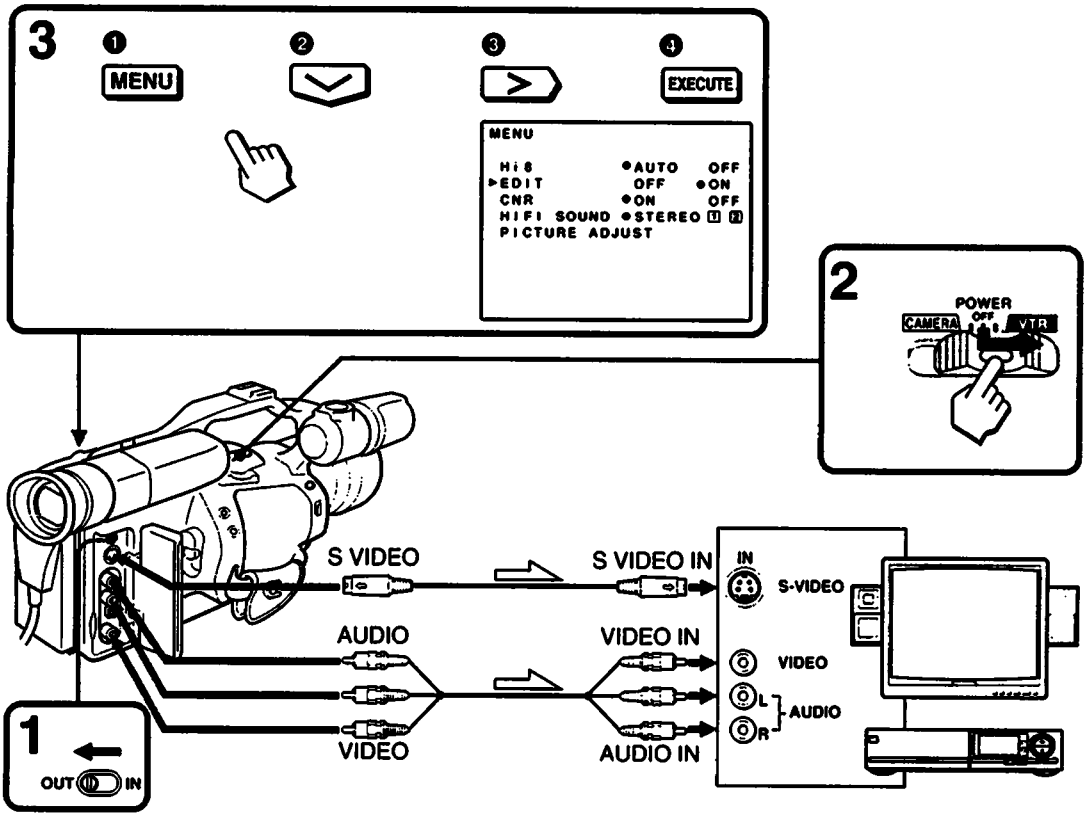
The picture may be distorted at the end of the inserted portion when it is played back.

# Editing onto Another Tape

You can create your own video program by editing with any other 8 mm, Hi8, Betamax, VHS, S-VHS, VHSC or S-VHSC VCR that has video/audio inputs.

## Before Editing

We recommend that you use power from the AC outlet using the AC power adaptor. Connect the camcorder to your VCR using the supplied connecting cable. Set the TV/VCR selector on the TV to VCR and set the input selector on the VCR to LINE. (1) Set the OUT/IN selector to OUT. (2) While pressing the small green button on the POWER switch, slide the POWER switch to VTR. (3) Set EDIT mode to ON in the menu system (p.30).




If your TV or VCR is a monaural type, connect only the white plug for audio on both the camcorder and the TV or VCR.

If you are connecting the camcorder using the S video cable, you do not need to connect the yellow (video) plug of the A/V connecting cable.

## Starting Editing

Make sure that the OUT/IN selector is set to OUT. (1) Insert a blank tape (or a tape you want to record over) into the recording VCR and the recorded tape into the camcorder. (2) Play back the recorded tape on the camcorder until you locate the point where you want to start editing. Then set the camcorder to playback pause mode. (3) Set the recording VCR to recording pause mode. (4) Press II on the camcorder and VCR simultaneously to start editing. (5) If the portion you want to eliminate is played back, set the VCR to recording pause mode again. Then repeat steps 2 and 4.

### *To Stop Editing*

Press □ on the camcorder and VCR. When you finish editing, reset EDIT mode to OFF(p.72).

**Use of the EDITSEARCH button**

To play back a tape in the forward or reverse direction keep pressing EDITSEARCH during playback pause mode. You can play back still pictures successively at specific intervals by pressing EDITSEARCH intermittently.

**Note on DISPLAY function**

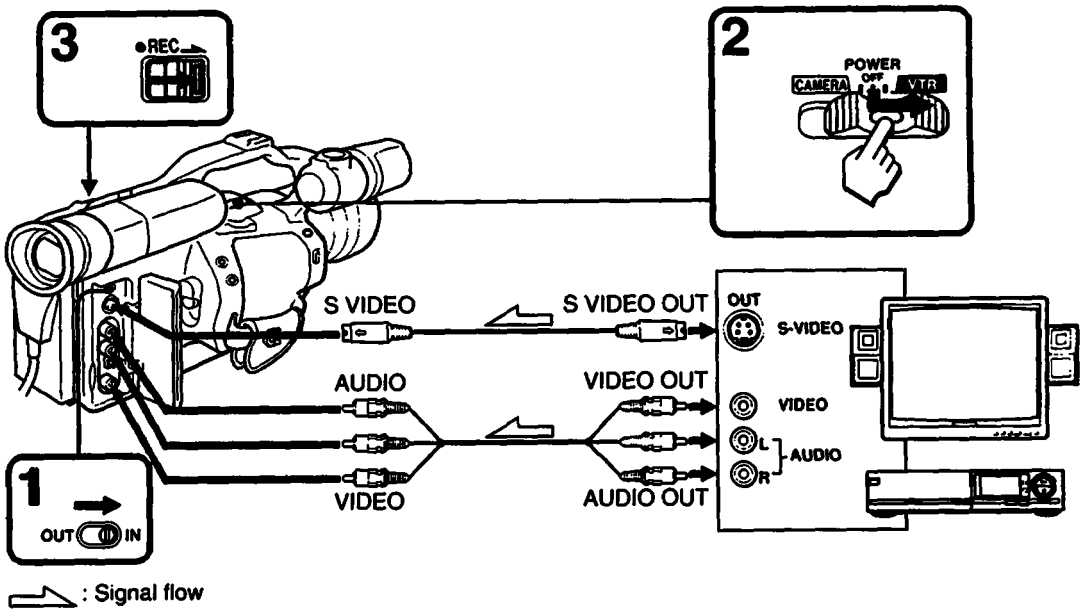
If you have displayed the viewfinder screen indicators on the TV, erase the indicators by pressing DISPLAY so that they will not be superimposed on the edited tape.

**Note on the data code and RC time code**

The data code and RC time code recorded with the camcorder are not output from the S VIDEO connector or VIDEO jack. You can only record the data code that is displayed in the viewfinder or TV screen by pressing DISPLAY.

# Recording from a TV or VCR

You can record a tape from another VCR or a TV program from a TV that has video/audio outputs. Connect the camcorder to the TV or VCR with the supplied A/V cable. (1) Set the OUT/IN selector to IN. (2) While pressing the small green button on the POWER switch, slide the POWER switch to VTR. (3) Press the ● REC switch in the direction of the arrow at the point where you want to start recording.




### To Stop Recording Momentarily

Press ❚❚. Press it again to resume recording.

### To Stop Recording

Press □.

## Replacing Recording on a Tape (Insert Editing)

You can insert a new scene from a VCR onto your originally recorded tape by specifying starting and ending points.
Connections are the same as in "Recording from a TV or VCR" above. (1) Set the OUT/IN selector to IN. (2) While pressing the small green button on the POWER switch, slide it to VTR. (3) Locate the start point to be inserted on the VCR and set it to playback pause mode. (4) Locate the point where the insert should end by pressing ◀◀ or ▶▶ on the camcorder and set it to playback pause mode. (5) Press RESET. The counter resets to 0:00:00. (6) Locate the point where the insert should begin by pressing ◀◀ on the camcorder and set it to recording pause mode. (7) Press ZERO MEM. The ZERO MEM indicator flashes and the end point of the insert is stored in memory. (8) Press ❚❚ on the camcorder and the VCR simultaneously to start insert editing. The insert editing stops automatically near the zero point on the counter.

### To Change the End Point

Press ZERO MEM so that the ZERO MEM indicator disappears, and begin from step 4.

**Note**

The picture may be distorted at the end of the inserted portion when it is played back.

Additional Information

# Usable Cassettes and Recording/Playback Modes

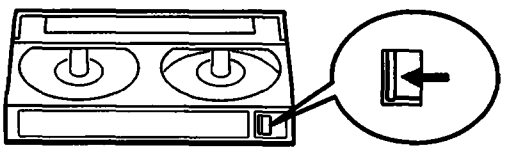
## Selecting Cassette Types

This Hi8 system is an extension of the standard 8 mm system, and was developed for higher-quality pictures. You can use Hi8 video and standard 8 mm cassettes. To record in the Hi8 system, you must use Hi8 video cassettes. You cannot record on standard 8 mm cassettes in the Hi8 system.
If you are going to play back the tape using a standard 8 mm video recorder/player, you should record the tape in the standard 8 mm system.
If you want to use a Hi8 cassette with the standard 8 mm recording system, set the Hi8 mode to OFF in the menu system before recording (p.29).

| To play back in | Record using cassette type | Set Hi8 setting to |
|---|---|---|
| Hi8 | Hi8 | AUTO |
| standard 8 mm | Hi8 | OFF |
| | 8 | AUTO (or OFF) |

### To Prevent Accidental Erasure

*Slide the tab on the cassette to expose the red mark.*



If you try to record with the red mark exposed, REC and ⏏ flash in the viewfinder, which indicate you cannot record on the tape. To re-record on this tape, slide the tab back out to cover the red mark.

## When You Play Back

The camcorder automatically select the playback mode according to the recording system (Hi8/standard 8 mm, SP/LP mode) in which you recorded the tape.

### To Play Back a Dual Soundtrack Tape

To monitor the desired sound, set HIFI SOUND to 1 or 2 in the menu system.(p.30)
When you finish playing back the dual soundtrack tape, reset HIFI SOUND mode to STEREO.

**Notes on AFM Hi-Fi stereo**

When you play back a tape, the sound is in monaural if:

- You record the tape using this camcorder, then play it back on an AFM Hi-Fi monaural video recorder/player.
- You record the tape on an AFM Hi-Fi monaural video recorder, then play it back on this camcorder.

**LP (Long play) mode**

When you play back a tape recorded in LP mode, the LP indicator lights up in the viewfinder. This camcorder cannot record tapes in LP mode.

**PCM recording and playback**

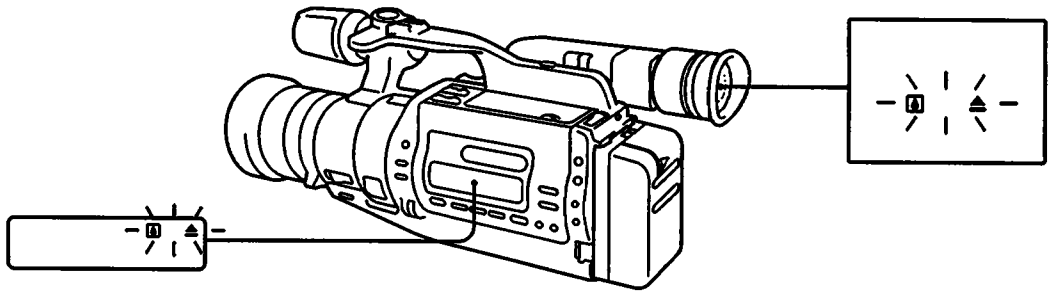
This camcorder cannot perform PCM recording or playback. When after-recording on the PCM recorded tape with this camcorder, sound may not be heard even when played back with the VCR with PCM function. In this case, set the AUDIO MONITOR switch on the VCR to STANDARD.

## Moisture Condensation

If the camcorder is brought directly from a cold place to a warm place, moisture may condense inside the camcorder, on the surface of the tape, or on the lens. If this happens, the tape may stick to the head drum and be damaged or the camcorder may not operate correctly. To prevent possible damage under these circumstances, the camcorder is furnished with moisture sensors. However, take the following precautions.

### Inside the Camcorder

When ⊡ and ⏏ flash in the viewfinder and the display window, this indicates that moisture has condensed inside the camcorder. If this happens, none of the functions except cassette ejection will work.
**Eject the tape, turn off the camcorder, and leave it with the cassette compartment open for about 1 hour.**
If ⊡ does not light up when you turn on the power, you can use the camcorder again.



### On the Surface of the Tape

If there is moisture on the surface of the tape, when you insert tape and press a tape transport button, ⏏ flashes in the viewfinder and the display window. If this happens, none of the functions except cassette ejection will work.
**Eject the tape and let it sit for about 1 hour.**
If ⏏ does not light up when you insert the tape and press a tape transport button, you can use the camcorder again.

### On the Lens

No indicator will appear, but the picture becomes dim. Turn off the power and do not use the camcorder for about 1 hour.

### How to Prevent Moisture Condensation

When bringing the camcorder from a cold place to a warm place, put the camcorder in a plastic bag and allow it to adapt to room conditions over a period of time.

1 Be sure to tightly seal the plastic bag containing the camcorder.
2 Remove the bag when the air temperature inside it has reached the temperature surrounding it (after about one hour).

## Video Head Cleaning

To ensure clear pictures, clean the video heads periodically. When playback pictures are "noisy" or hardly visible, the video heads may be contaminated.

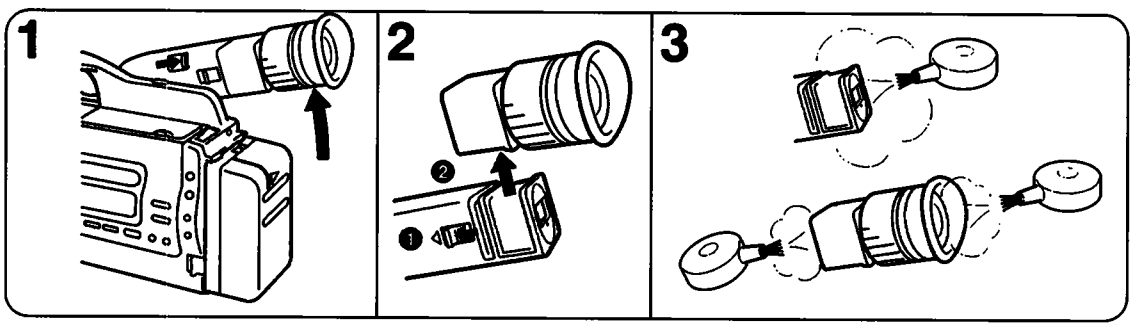
**[a]** Slight contamination
**[b]** Critical contamination
If this happens, clean the video heads with the Sony V8-25CLH cleaning cassette (not supplied). After checking the picture, if it is still "noisy," repeat the cleaning. (Do not repeat cleaning more than 5 times.)

**Caution**
Do not use a commercially available wet-type cleaning cassette. It may damage the video heads.

**Note**
If the V8-25CLH cleaning cassette is not available in your area, consult your Sony service facility.

## Removing Dust from Inside the Viewfinder

(1) While sliding the viewfinder lock RELEASE knob in the direction of the arrow, lift up the viewfinder.
(2) Detach the eyecup while sliding the viewfinder eject knob in the direction of the arrow. (3) Clean the surface of the viewfinder and of the eyecup with a commercially available blower for a still camera. If dust still remains, use a cotton swab.



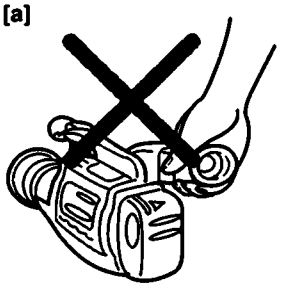

### To Reattach the Eyecup
Push in the eyecup until it clicks.

## Precautions

### On Operation

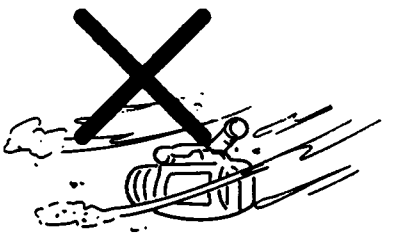
- Operate the camcorder using 7.2 V (battery pack), or 6.5 V (AC power adaptor).
- For DC or AC operation, use only the accessories recommended in this manual.
- You cannot use the AC-V25 AC power adaptor (not supplied) with this camcorder.
- Should any solid object or liquid fall into the casing, unplug the camcorder and have it checked by qualified personnel before operating it any further.
- Do not pick up the camcorder by the viewfinder. **[a]**
- Avoid rough handling or mechanical shock. Be particularly careful of the lens.
- Keep the POWER switch set to OFF when not using the camera.
- Do not wrap up the camcorder and operate it since heat may build up internally.
- Keep the camcorder away from strong magnetic fields or mechanical vibration.
- Do not let sand get into the camcorder. When you use the camcorder on a sandy beach or dusty place, protect it from the sand or dust. Sand or dust may cause the unit to malfunction and sometimes the malfunction cannot be repaired. **[b]**
- Do not let the camcorder get wet. Keep the camcorder from rain or sea water. It may cause a malfunction and sometimes the malfunction cannot be repaired. **[c]**

**[a]**



**[b]**

**[c]**



### On Handling Tapes

- Do not insert anything into the small holes on the rear of the cassette. These holes are used to sense the type, thickness of tape, or if the tab is out or in.

### On Care

- Never leave the camcorder under temperatures above 60°C (140°F), such as in a car parked in the sun or under direct sunlight.
- When the camcorder is not to be used for a long time, disconnect the power source and remove the tape Periodically turn on the power, operate the camera and player sections and play back a tape for about 3 minutes.
- Clean the lens with a soft brush to remove dust. If there are fingerprints on the lens, remove them with a soft cloth.
- Clean the camcorder casing with a soft dry cloth, or a soft cloth lightly moistened with a mild detergent solution. Do not use any type of solvent that may damage the finish.

# Using Your Camcorder Abroad

Each country has its own electricity and TV color systems. Before using your camcorder abroad, check the following points:

## Power Sources

You can use your camcorder in any country with the supplied AC power adaptor within 100 V to 240 V AC, 50/60 Hz. If you cannot attach the power adaptor to the wall outlet, use a power cord plug adaptor (not supplied).

## Difference in Color Systems

This camcorder is an NTSC system-based camcorder. If you want to view the playback picture on a TV, it must be an NTSC system-based TV or a PAL-M system-based TV with NTSC/PAL-M transcoder. Check the following alphabetical list.

**NTSC system countries**
Bahama Islands, Bolivia, Canada, Central America, Chile, Colombia, Ecuador, Jamaica, Japan, Korea, Mexico, Peru, Surinam, Taiwan, the Philippines, the U.S.A., Venezuela, etc.

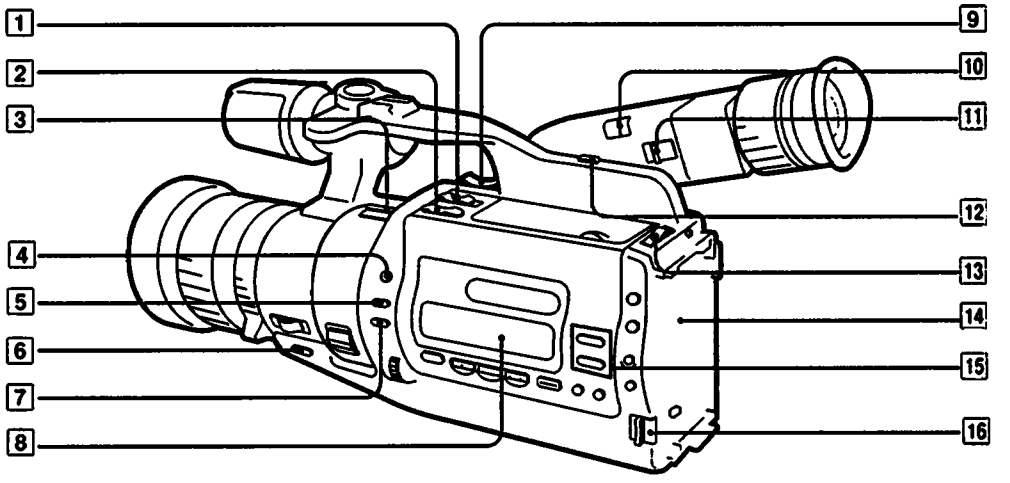
**PAL system countries**
Australia, Austria, Belgium, China, Denmark, Finland, Germany (former West Germany), Great Britain, Holland, Hong Kong, Italy, Kuwait, Malaysia, New Zealand, Norway, Portugal, Singapore, Spain, Sweden, Switzerland, Thailand, etc.

**PAL M system country**
Brazil

**PAL N system countries**
Argentina, Paraguay, Uruguay

**SECAM system countries**
Bulgaria, France, Guyana, Hungary, Iran, Iraq, Monaco, Poland, former Soviet Union, etc.

# Identifying the Parts




**1 POWER switch (p.18, 24)**
CAMERA: for camera recording
VTR: for playing back or editing tape
OFF: power off

**2 EDITSEARCH button (p.22, 70)**
Press this button to check the recorded scene in the viewfinder in recording standby mode.
+ side: to view the forward playback picture
– side: to view the reverse playback picture

**3 ND FILTER switch (p.19, 48)**
Slide this switch if the ND ON indicator flashes in the viewfinder. The filter activates to reduce brightness.
To deactivate the filter, slide it again so that the indicator disappears.

**4 COUNTER/TIME CODE button (p.26, 68)**
Press to display the tape counter or the RC time code.

**5 COUNTER RESET button (p.26, 71)**
Press to reset the tape counter to zero.

**6 FADER button (p.50)**
Press this button to fade a picture in when you start recording, or to fade it out when you finish recording.

**7 ZERO MEM (memory) button (p.26, 71)**
Press to store the counter zero point of the tape in memory.

**8 Display window (p.92)**
Displays operating information such as the clock or the tape counter.

**9 Power zoom button (p.20)**
Press to change the size of the subject in the scene.
T side: for telephoto (subject appears closer)
W side: for wide-angle (subject appears farther away)

**10 (Viewfinder lock) RELEASE knob (p.17, 77)**
To lift up the viewfinder, slide this knob in the direction of the arrow.

**11 Viewfinder eject knob (p.77)**
To detach the viewfinder for cleaning the surface of screen, slide it in the direction of the arrow.

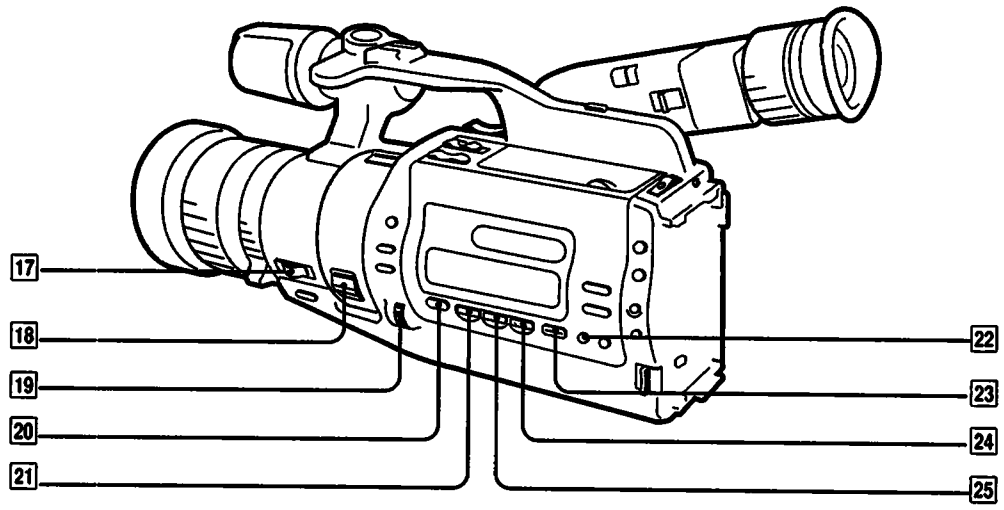
**12 (Viewfinder) SLIDE button (p.19)**
Press to slide the viewfinder if your nose touches the battery pack.

**13 EJECT (cassette eject) knob (p.15)**
Slide to open the cassette compartment.

**14 Battery mounting surface (p.9)**
Attach the battery pack to this surface.

**15 DATE(+) and TIME(NEXT) buttons (p.14, 27)**
Press to set the clock, to display or to turn off the date and time in the viewfinder. When setting the date and time, press DATE(+) button to advance numbers and press TIME(NEXT) button to set the next factor.

**16 BATT (battery eject) knob (p.9)**
To detach the battery pack, slide it in the direction of the arrow.




**17 FOCUS switch (p.18, 35)**
Slide this switch to AUTO to adjust the focus automaticaly and to MANUAL to adjust the focus manually. When shooting in manual focus mode, you can switch to automatic focusing while you hold to slide the switch to PUSH AUTO.

**18 AUTO LOCK switch (p.31)**
When you set this switch to the topmost (green) position, the camcorder adjusts the aperture, shutter speed (between 1/60 and 1/250), gain and white balance automatically. When you slide it down to the center position, you can adjust the aperture, shutter speed, gain and white balance manually. You can also use the PROGRAM AE function. To retain the settings you adjust manually, slide it down to HOLD.

**19 CONTROL dial (p.31, 43)**
To adjust the aperture, shutter speed and gain level manually, press IRIS, SHUTTER SPEED and GAIN, respectively, and turn this dial to obtain the desired value.

**20 PROGRAM AE button (p.32, 39)**
Press to select from four PROGRAM AE modes (Portrait/Sports/Aperture Priority/Shutter Priority mode) and manual adjustment mode, to fit the shooting situation.

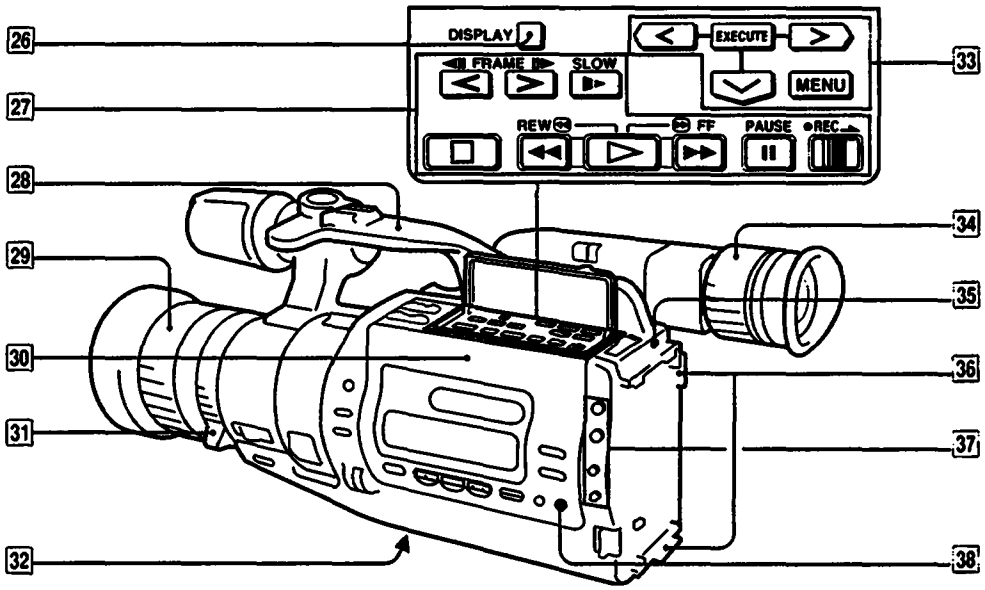
**21 IRIS button (p.43)**
When you press this button, the aperture is locked at the actual aperture value. To adjust the aperture manually, press this button and select the desired value with the CONTROL dial as follows:
Upward: to open the aperture
Downward: to close the aperture

**22 (One-push white balance) button (p.38)**
Press to adjust the white balance and maintain that condition after setting the white balance mode to .

**23 WHT BAL (white balance) button (p.37)**
Press to adjust the white balance manually. Each time you press this button, the white balance mode changes to Automatic (no indicator in the viewfinder), One-push adjustment (), Outdoors ( • ) and Indoors (), cyclically.

**24 GAIN button (p.43)**
When you press it, the gain is locked at the actual level. If you adjust the aperture manually first, the gain is locked at the level depending on the adjusted aperture value. To adjust the gain manually, press this button and select the desired level with the CONTROL dial as follows:
Upward: to increase the gain
Downward: to decrease the gain

**25 SHUTTER SPEED button (p.43)**
When you press this button, the shutter speed is locked at the actual speed between 1/60 and 1/250. Continue to press the button to change the shutter speed to 1/100, 1/1000 and Auto (between 1/60 and 1/250). To adjust the shutter speed manually, press this button and select the desired speed with the CONTROL dial as follows:
Upward: to get a higher speed
Downward: to get a slower speed




**26 DISPLAY button (p.24)**
Press to display the viewfinder screen indicators on the TV when you connect the camcorder to a TV.

**27 Tape transport buttons (p.24, 25)**
■ STOP
◀◀ REW (rewind)
▷ PLAY (playback)
▶▶ FF (fast-forward)
II PAUSE
● REC (recording)
< ◀II/II▶ > FRAME (direction select/frame-by-frame)
▮▶ SLOW (slow speed playback)

**28 Carrying handle**

**29 Focus ring (p. 35)**
Turn to focus the subject manually.

**30 Cassette compartment (p.15)**

**31 Zoom lever (p.35)**
Turn to change the size of the subject in the scene manually. Turn it upward for telephoto and downward for wide-angle.

**32 Tripod receptacle (p.17)**
Attach a tripod (not supplied) here.
When attaching a non-Sony tripod, make sure that the length of the camera mounting screw is shorter than 6.5 mm (9/32 inches). Otherwise, the screw might damege the inner part of the camcorder.

**33 Menu operation buttons (p.30)**
MENU: Press to display the menu in the viewfinder.
v: Press to select the desired item.
</>: Press to set the mode of the selected item.
EXECUTE: Press to store the settings.

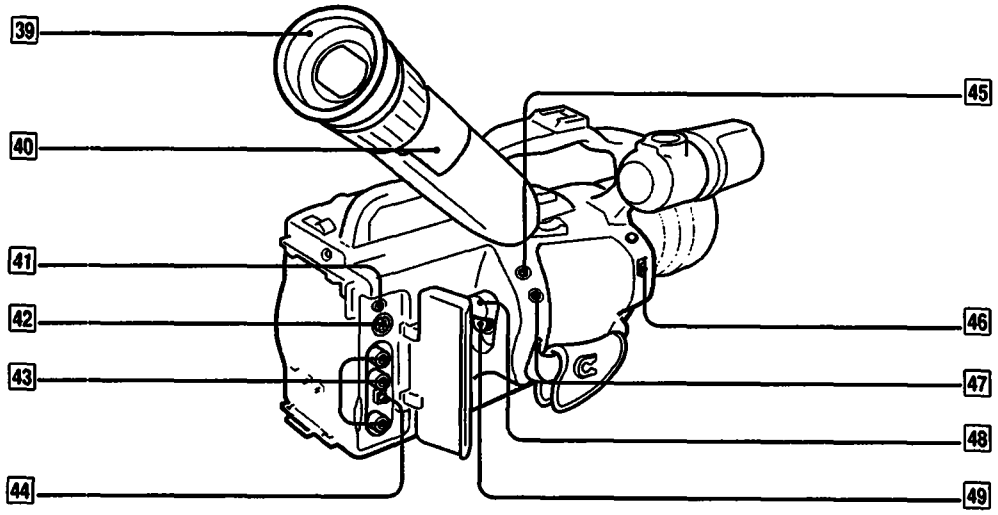
**34 Viewfinder lens adjustment ring (p.16)**
To focus the viewfinder lens, turn this ring until the indicator in the viewfinder comes into sharp focus.

**35 Camera recording/battery lamp (p.18, 91)**
This red lamp lights up during camera recording. When it flashes, the battery is dead.

**36 Hooks for shoulder strap (p.86)**
Attach the shoulder strap (supplied) here.

**37 SUPERIMPOSE buttons (p.54, 58)**
Use to superimpose a title over the scene.
TITLE 1 and TITLE 2 buttons: Press to insert or turn off the title. You can store a title to each button.
MEMORY: Press to store a title.
COLOR/MODE: Press to select the color of the title while the title is displayed in the viewfinder. Press to select the display mode of the title while the title is not displayed.

**38 INDEX MARK button (p.61)**
Press to mark an index signal. If you mark it at the beginning of each program, you can easily locate the desired one later.




**39 Eyecup (p.17)**
Place your eye against it. You can also view the picture without touching your eye against it.

**40 Viewfinder (p.17)**
You can monitor the picture in monochrome being recorded or played back. For details on the indicators in the viewfinder, see page 92.

**41 OUT/IN selector (p.23, 72, 74)**
The VIDEO/AUDIO and S VIDEO jacks of this camcorder work as both input and output jacks. Set the selector to OUT to view the recorded picture on the TV or to record onto another tape. Set the selector to IN to record from a TV or a VCR.

**42 S VIDEO jack (4-pin mini-DIN connector) (p.23, 72, 74)**
You can get a clearer picture if your TV or VCR has an S video jack. Connect to this jack using the supplied S video connecting cable. To view the recorded picture on the TV or to record onto another tape, connect this jack and the S video input jack on the TV or VCR. To record from a TV or a VCR, connect this jack and the S video output jack on the TV or VCR.

**43 VIDEO/AUDIO jacks (p.23, 72, 74)**
To view the recorded picture on the TV or to record onto another tape, connect these jacks and the VIDEO/AUDIO input jacks on the TV or VCR using the supplied A/V connecting cable. To record from a TV or a VCR, connect these jacks and the VIDEO/AUDIO output jacks on the TV or VCR.

**44 RFU DC OUT (RFU adaptor DC output) jack (p.23)**
To view the recorded picture on a TV that has only an antenna input, connect the RFU adaptor here.

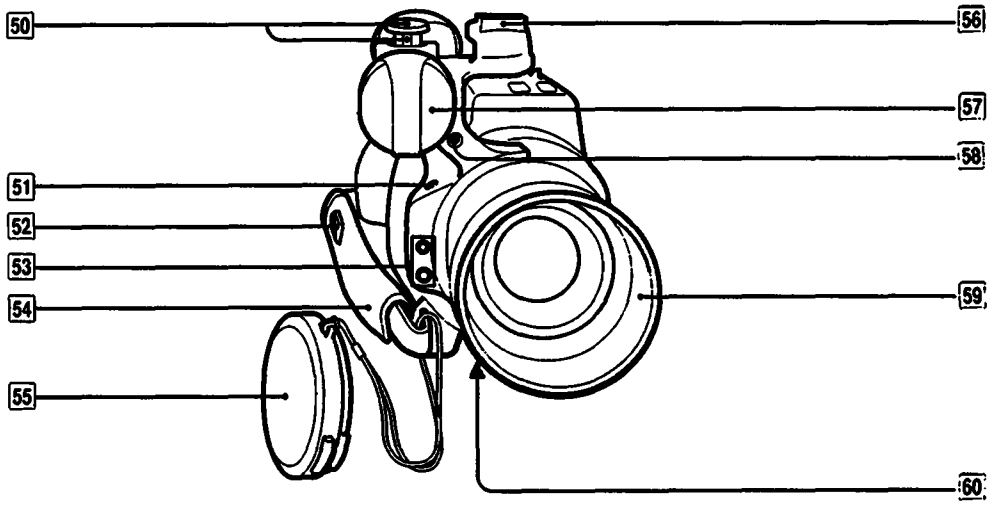
**45 REMOTE (LANC) control jack**
Connect the LANC connecting cable to a wired remote control unit such as a editing controller. In this case, you cannot use the supplied Remote Commander.
**stands for Local Application Control Bus System. The control jack is used for controlling the tape transport of video equipment and peripherals connected to it. This jack has the same function as the connectors indicated as CONTROL L or REMOTE.**

**46 BUILT-IN MIC selector (p.21)**
Usually set to the green position. Set it to WIND to reduce wind noise. When you use an external microphone (not supplied), set it to the green position as the selector does not function.

**47 (headphones) jack (stereo) (p.19)**
Connect headphones (not supplied) to monitor the sound while viewing the playback or the recording picture.

**48 STANDBY switch (p.18)**
Slide this switch up until it snaps into STANDBY to set the camcorder to recording standby mode.

**49 START/STOP button (p.18)**
To start recording, press this button after setting the POWER switch to CAMERA and slide the STANDBY switch up. To stop recording, press it again.




**50 REMOTE COMMANDER ON (📷)/OFF (▭) switch and remote sensor (p.86)**
When you use the Remote Commander, press this switch lightly so the remote sensor pops. Aim the Remote Commander here for remote control.

**51 REC START/STOP button (p.17)**
Use to start or stop recording for low-position recording.

**52 Cap holder (p.18)**
When you remove the hood cap, hook it here.

**53 DC OUT (microphone power output) and MIC jacks (p.21)**
Connect an optional external microphone (stereo or monaural). If the microphone has two plugs, connect to both jacks. If you connect a "plug-in-power" microphone, use the MIC jack only.

**54 Grip strap (p.17)**
Put your hand through the grip strap to hold the camcorder. Adjust the length of the strap so that your thumb can easily touch the START/STOP button.

**55 Hood cap (p.18)**
To remove it, squeeze the tabs at both sides. Hook the hood cap to the cap holder on the grip strap.

**56 Accessory shoe**
Attach a video light, external microphone, etc. here.

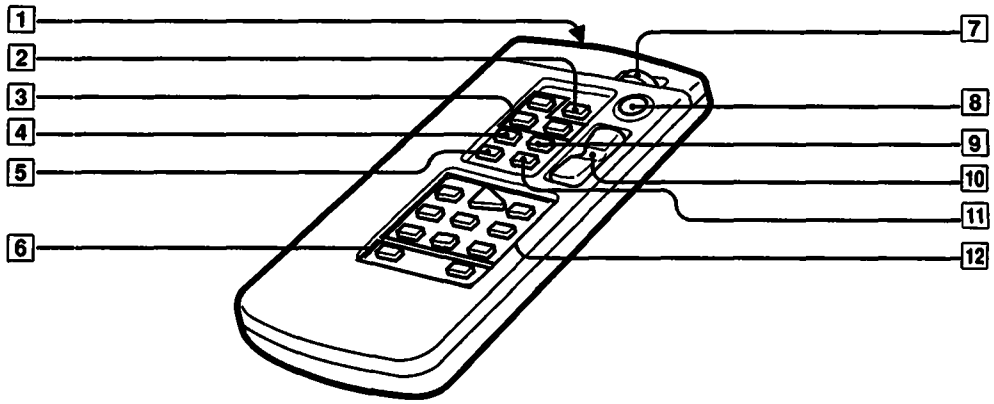
**57 Built-in microphone (stereo)**

**58 Camera recording/battery lamp (p.18, 91)**
This red lamp lights up during camera recording. When it flashes, the battery is dead.

**59 Lens hood**

**60 Lithium battery compartment (bottom) (p.12)**
Insert a lithium battery here to activate the clock and keep titles in memory.

## Wireless Remote Commander




1 **Transmitter**
Point toward the remote sensor to control the camcorder after turning on the camcorder.

2 **DISPLAY button**

3 **INDEX buttons (P.61–65)**
INDEX: Press to scan or search for the desired program on the tape on which index signals were marked.
INDEX MARK: Press to mark an index signal.
INDEX ERASE: Press to erase the index signal.

4 **TIME CODE WRITE button (P.69)**
To write the RC time code on a prerecorded tape, set the camcorder to playback pause mode, press this button and press ▷ or ❚❚.

5 **COUNTER RESET button**

6 **● REC (recording) buttons**
To record from a TV or a VCR, press both buttons simultaneously.

7 **HOLD switch**
Slide this switch in the direction of the arrow to prevent the buttons from being accidentally pressed.
**Before using this Remote Commander, slide in the direction opposite the arrow.**

8 **START/STOP button**

9 **DATA CODE button (P.27)**
To display the recording date or time in the viewfinder during playback, press this button. Each time you press it, the display changes to the date, time and no indicator, cyclically.

10 **Power zoom button**

11 **ZERO MEM button**

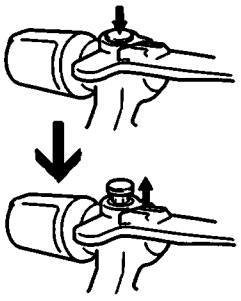
12 **Tape transport buttons**
×2 **(P.25)**
Other buttons function the same as those on the camcorder.

## Using the Remote Commander

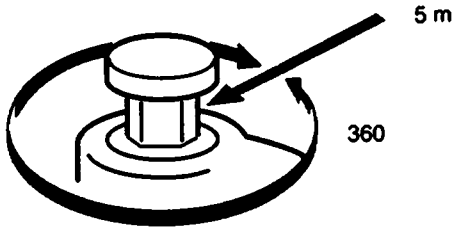
Press REMOTE COMMANDER on the camcorder lightly. The remote sensor pops up. **[a]**
Press it again so that the remote sensor pops down when not in use.

## Remote Control Direction [b]

[a]



[b]

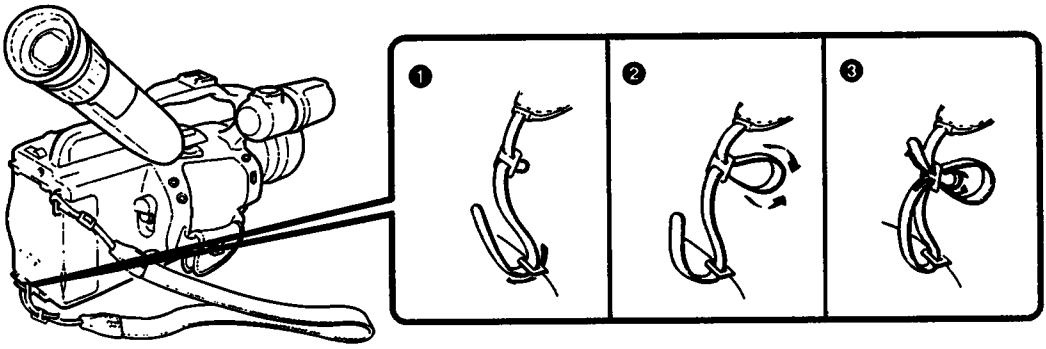



**Note on the remote control direction**
The camcorder may not be operated with the Remote Commander if the remote sensor is hidden by a part of the camcorder body.

**Notes on the Remote Commander**

- Keep the remote sensor away from strong light sources such as direct sunlight or illumination. Otherwise, the remote control may not be effective.
- Be sure that there are no obstacles between the remote sensor and Remote Commander.
- This camcorder works at commander mode VTR2. The commander modes (1,2 and 3) are used to distinguish this camcorder from other Sony VCRs to avoid remote control misoperation. If you use another Sony VCR at commander mode VTR2, we recommend that you change the commander mode or cover the remote sensor of the VCR with black paper.

## Attaching the Shoulder Strap



# Specifications

## System

Video recording system
Rotary two heads, Helical scanning FM system
Audio recording system
Rotary head, FM system
Video signal NTSC color, EIA standards
Usable cassette
8 mm video format cassette (Hi8 or standard 8 mm)
Tape speed SP mode: Approx. 1.43 cm (19/32 inches)/sec.
LP mode: Approx. 0.72 cm (5/16 inches)/sec. (playback only)
Recording time
SP mode: 2 hours (E6/P6-120)
Playback time SP mode: 2 hours (E6/P6-120)
LP mode: 4 hours (E6/P6-120)
Fast forward/rewind time
Approx. 6 min. (E6/P6-120)
Image device 3CCD (Charge Coupled Device 1/3")
Viewfinder Electronic viewfinder (monochrome)
Lens Combined 12 × power zoom lens
f=5.5 to 66 mm (7/32 to 2 5/8 inches)
F1.6 to 1.8
40 to 480 mm (1 5/8 to 2 1/8 inches) when converted into a 35-mm still camera
Filter diameter 52 mm (2 1/8 inches)
TTL autofocus system
Inner focus wide macro system
Color temperature
Auto
Indoors (3200 K)
Outdoors (5800 K)
Minimum illumination
4 lx (F1.6)
Illumination range
4 lx to 100,000 lx
(0.37 to 9.294 footcandles)
Recommended illumination
More than 100 lx (9.3 footcandles)
Shutter speed control
1/60 to 1/10000 (16 steps)
Aperture control
Auto/manual (13 steps)
Gain control Auto/manual (8 steps)

## Input and output connectors

S video input/output
Selectable with the OUT/IN selector
4-pin mini DIN (1)
Luminance signal: 1 Vp-p, 75 ohms, unbalanced, sync negative
Chrominance signal: 0.286 Vp-p, 75 ohms, unbalanced
Video input/output
Selectable with the OUT/IN selector
Phono jack (1) 1 Vp-p, 75 ohms, unbalanced, sync negative
Audio input/output
Selectable with the OUT/IN selector
Phono jacks (2: stereo L and R)
Input: –7.5 dBs, input impedance more than 47 kilohms
Output: –7.5 dBs, (at load impedance 47 kilohms), impedance less than 2.2 kilohms
RFU DC OUT Special mini-jack, 5 V DC (1)
Headphones jack
Stereo minijack (ø 3.5) (1)
REMOTE jack Stereo mini-minijack (ø 2.5) (1)
MIC jack Stereo minijack (1), –66 dBs, low impedance with 2.5 to 3 V DC, output impedance 6.8 kilohms (ø 3.5)
MIC DC OUT Special minijack, 5 V DC

## General

Power requirements
On battery mounting surface
6.0 V (battery pack)
7.5 V (AC power adaptor)
Power consumption
9.4 W (camera recording)
Installation Vertically, horizontally
Operating temperature
0° C to 40° C (32° F to 104° F)
Storage temperature
–20° C to +60° C (–4° F to 140° F)
Dimensions 116 × 148 × 352 mm (w/h/d)
(4 5/8 × 5 7/8 × 13 7/8 inches)
(including the lens hood)
Mass Approx. 1.5 kg (2 lb. 7 oz.)
Approx. 2.0 kg (4 lb. 7 oz.)(including the battery pack NP-77H, lithium battery CR2025, cassette E6-120, jack covers, shoulder strap, lens hood, hood cap)
Microphone Electret condenser microphone, stereo type

Design and specifications are subject to change without notice.

# Trouble Checks

If you run into any problems using the camcorder, use the following table to troubleshoot the problem.

| | Symptom | Cause | Corrective Actions | Page |
|---|---|---|---|---|
| During Recording | START/STOP does not operate. | The POWER switch is set to VTR. | Set it to CAMERA. | 18 |
| | | The tape has run out. | Rewind the tape or use a new one. | 15 |
| | | The tab on the cassette is out (red). | Use a new tape or slide the red tab. | 75 |
| | | The tape is stuck to the drum. | Eject the cassette. | 76 |
| | The power goes off. | While being operated in CAMERA mode, the camcorder has been in the pause mode for more than 5 minutes. | Slide the STANDBY switch down once and slide it up again. | 18 |
| | | INT REC or FRAME REC mode in the menu system is set to ON. | Set it to OFF. | 51, 52 |
| | The image on the viewfinder screen is not clear. | The viewfinder lens is not adjusted. | Adjust the viewfinder lens. | 16 |
| | The autofocusing function does not work. | The FOCUS switch is set to MANUAL. | Set it to AUTO. | 18 |
| | | Shooting conditions are not suitable for autofocusing operation. | Set the FOCUS switch to MANUAL and adjust the focus manually. | 35 |
| | | There is dust inside the lens of the focus ring. | Clean the lens with a dry soft cloth. | 78 |
| | Nothing can be viewed except for a black screen in the viewfinder. | The power of the camcorder was turned off with the aperture closed. | Open the aperture in manual mode. | 43 |
| | Under some conditions, the picture may look as if the shutter is often released. | The ND shutter functions. The camcorder is not malfunctioning. | Set ND SHUTTER to OFF in the menu system. | 48 |
| During Playback | The tape does not move when a tape transport button is pressed. | The POWER switch is set to CAMERA or OFF. | Set it to VTR. | 24 |
| | | The tape has run out. | Rewind the tape. | 24 |
| | A vertical band appears when a subject such as lights or a candle flame is shot against a dark background. | The contrast between the subject and background is too high: The camcorder is not malfunctioning. | ——— | — |
| | A vertical band appears when shooting a very bright subject at high speeds. | Smear occurs: The camcorder is not malfunctioning. | ——— | — |

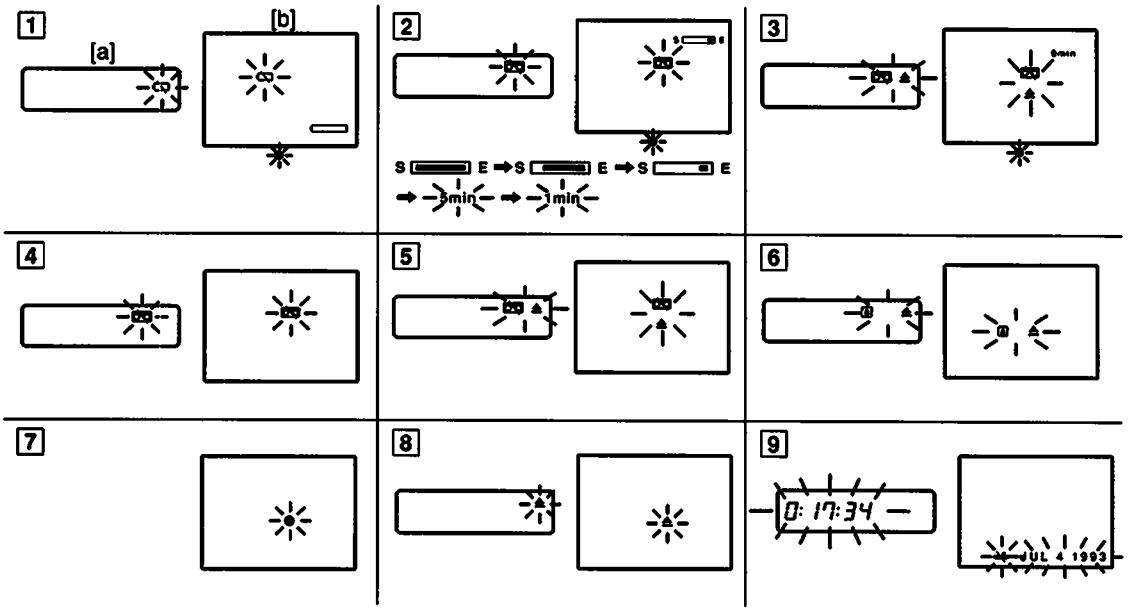
| | Symptom | Cause | Corrective Actions | Page |
|---|---|---|---|---|
| During Playback | The color of the playback is not appropriate. | The AUTO LOCK switch is slid down to the center position and the white balance indicator is displayed in the viewfinder. | When shooting, slide the AUTO LOCK switch up to the green position. | 31 |
| | | Shooting condition is not suitable for automatic white balance operation. | Slide the AUTO LOCK switch down and adjust the white balance manually. | 37 |
| | The playback picture is not clear or is not monitored. | The channel or input for the camcorder is not selected correctly on the TV. | Select it correctly. | 23 |
| | | EDIT mode is set to ON in the menu system. | Set it to OFF. | 72 |
| | | The video heads may be contaminated. | Clean the heads using the Sony V8-25CLH cleaning cassette. | 77 |
| | No sound or only a low sound is heard when playing back a tape. | The stereo tape is played back with the camcorder set to HIFI SOUND [1] or [2]. | Set HIFI SOUND mode to STEREO. | 75 |
| During Recording/Playback | The power does not go on. | The battery is not inserted, or it is dead. | Insert a battery or use a charged battery. | 9 |
| | | The AC power adaptor is not connected to a wall outlet. | Connect the adaptor to a wall outlet. | 28 |
| | The battery pack is quickly discharged. | The ambient temperature is too low. | | 10 |
| | | The battery pack has not been charged fully. | Charge the battery pack again. | 8 |
| | | The battery pack is completely dead, and cannot be recharged. | Use another battery pack. | 10 |
| | The cassette cannot be removed from the compartment. | The battery pack or AC power adaptor is detached. | Attach the battery pack or AC power adaptor to the camcorder. | 9, 28 |
| | | The battery is dead. | Use a charged battery. | 8 |
| | No function except for cassette ejection works. | Moisture condensation has occurred. | Remove the cassette and do not use the camcorder for at least an hour. | 76 |
| | | Abnormal matter occurs. | | |

| | Symptom | Cause | Corrective Actions | Page |
|---|---|---|---|---|
| Others | The supplied Remote Commander does not work. | The REMOTE COMMANDER button on the camcorder does not pop up. | Press REMOTE COMMANDER lightly so the remote sensor pops up. | 86 |
| | | Something is blocking the Remote Commander. | Take away the obstacle. | 86 |
| | | The remote sensor is hidden by a part of the camcorder body. | Point the Commander to the remote sensor correctly. | 86 |
| | | The batteries are not inserted with the correct polarity. | Insert the batteries with the correct polarity. | 7 |
| | | The batteries are dead. | Replace with new ones. | 7 |
| | | The HOLD switch is working. | Set the switch in the direction opposite the arrow. | 24 |
| | Recording onto another tape cannot be made. | The OUT/IN selector is set to IN. | Set it to OUT. | 72 |
| | Recording from a TV or a VCR cannot be made. | The OUT/IN selector is set to OUT. | Set it to IN. | 74 |
| | There is dust inside the viewfinder. | — | Slide out the eyecup and clean the viewfinder screen or viewfinder lens. | 77 |

# Indicators in the Display Window and the Viewfinder

## Warning Indicators

If indicators flash in the display window [a] or the viewfinder [b], or a caution lamp on the camcorder flashes, check the following:




1 Battery Remaining
Slow flashing: The battery is weak.
Fast flashing: The battery is dead.

2 The tape is near the end.

3 The tape has run out.

4 No tape has been inserted.

5 The tab on the tape is out (red) (p.75).

6 Moisture condensation has occurred (p.76).
- When the cassette is not inserted, the ⏏ indicator does not appear.

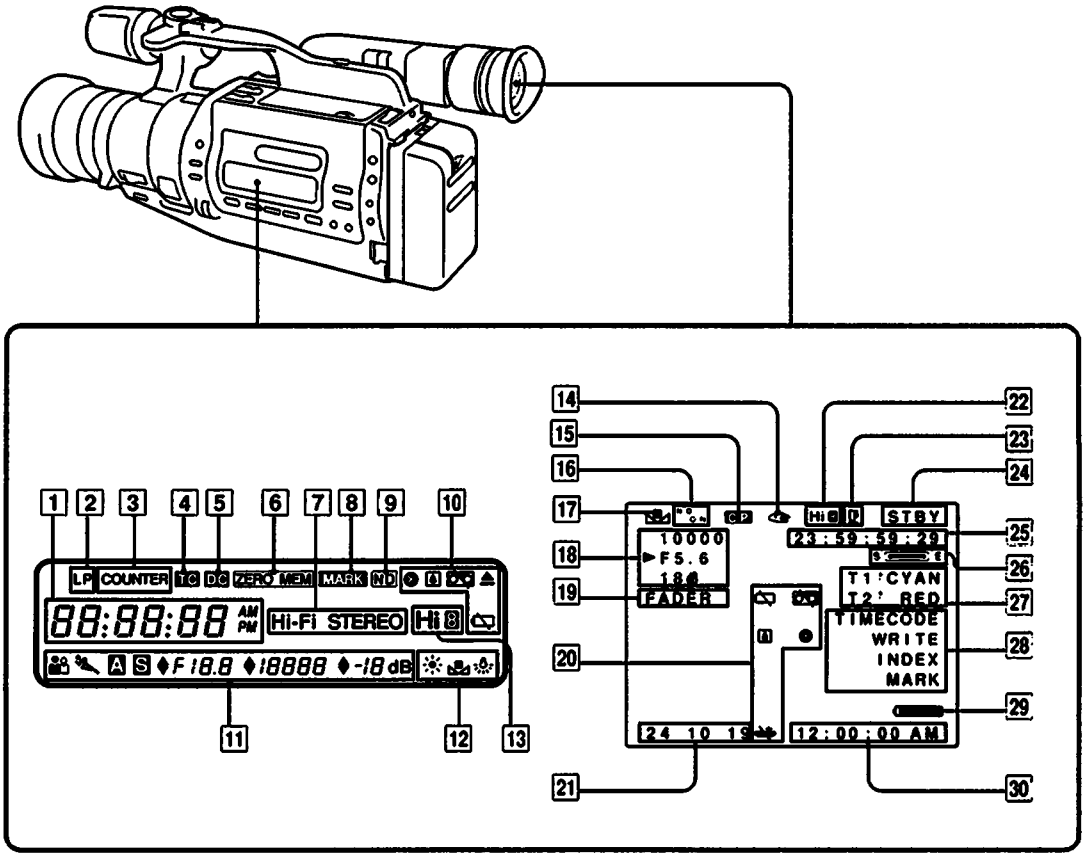
If this happens, eject the tape, turn off the camcorder, and leave it with the cassette compartment open for about 1 hour.

7 The video heads may be contaminated (p.76).

8 Some other trouble has occurred.
Disconnect the power source and contact your Sony dealer or local authorized facility.

9 The lithium battery is weak or the lithium battery is not installed (p.13).

## In the Display Window and the Viewfinder




1. Tape counter, time or date indicator (p.14, 26)
2. Lights up when playing back a tape recorded in LP mode (p.75)
3. COUNTER indicator (p.26, 71)
4. Time code indicator (p.68)
5. Data code indicator (p.27)
6. Zero memory indicator (p.26, 71)
7. Hi-fi stereo mode indicator (p.75)
8. Index mark indicator (p.61)
9. ND filter on indicator (p.19, 48)
10. Warning indicators (p.91)
11. PROGRAM AE and manual mode indicators (p.32, 43)
12. White balance mode indicators (p.37)
13. Playing back or recording in Hi8 format (p.75)
14. Manual focusing (p.35)
15. Custom mode indicator (p.59)
16. ND filter on/off indicator (p.19, 48)
17. White balance mode indicator (p.37)
18. PROGRAM AE and manual mode indicators (p.32, 43)
19. Fader function mode (p.50)
20. Warning indicators (p.91)
21. Data code (p.27)
22. Playing back or recording in Hi8 format (p.75)
23. Lights up when playing back a tape recorded in LP mode (p.75)
24. Camera operation and tape transport mode indicators (p.18, 24)
25. Tape counter (p.26, 71)
26. Tape remaining indicator (p.18)
27. Title mode and title color indicators (p.55, 56)
28. Index function mode, zero memory and RC time code indicators (p.26, 61, 68, 71)
29. Battery remaining indicator (p.11)
30. Date or Time (p.14)

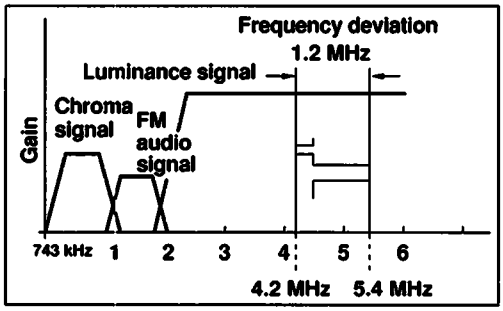
## Hi8 (High Eight) Video System

The 8 mm video system employs a metal powder tape. This means the video camera recorder is capable of recording a large amouht of information and enhances picture quality. Taking advantage of the 8 mm video system, the Hi8 video system has been developed. The main characteristics of the Hi8 video system are as follows:

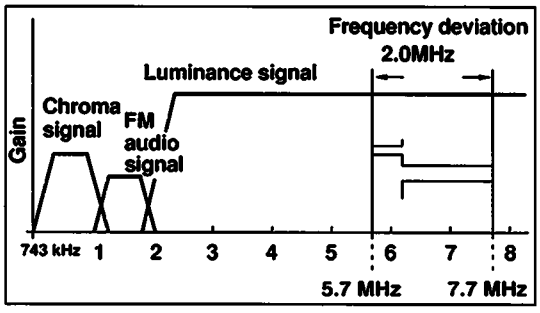
The information capacity is a key element for picture improvement. It can be increased by shifting up the FM carrier frequency range. In the Hi8 video system, the FM carrier frequency range of the luminance signal is shifted up to 5.7 – 7.7 MHz. This is higher than the 4.2 – 5.4 MHz range of the standard 8 mm video system. Thanks to this, the horizontal resolution is improved to more than 400 lines. **[a] [b]**

Metal evaporated tape is ideal for video systems because it has large magnetic energy that allows for high-density recording. The Hi8 video camera recorder uses such high-grade tape for the Hi8 video system, covering a wide frequency range, to achieve a high-quality video signal for recording/playback.

**[a] Frequency allocation of the standard 8 mm video system**




**[b] Frequency allocation of the Hi8 video system**

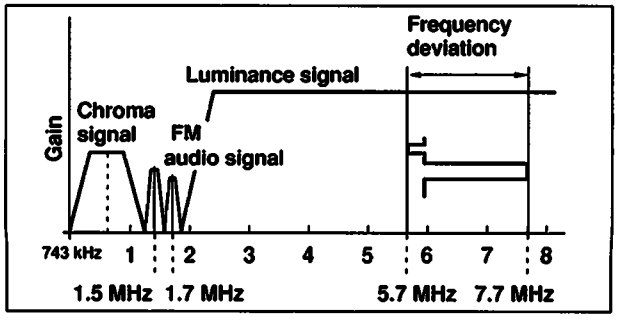



## HI-Fi Stereo System

On the 8 mm video standard track the sound is conventionally recorded/played back in AFM hi-fi monaural. On this camcorder, an AFM hi-fi stereo sound can be recorded on the standard track.
The AFM hi-fi stereo sound is recorded as L+R on the 1.5 MHz carrier and L–R on the 1.7 MHz carrier in FM as illustrated **[c]**. This method was adopted to maintain compatibility with the conventional AFM hi-fi monaural sound.
When playing back the tape recorded in this hi-fi stereo system, a matrix circuit is used to produce the L and R stereo sounds separately.
When a conventional AFM hi-fi monaural model is used to play back a tape recorded by this camcorder in AFM hi-fi stereo, the playback sound will be in an L+R monaural sound. This is because the manaural models will play back only the sound recorded in the 1.5 MHz carrier.
The AFM hi-fi stereo system of this camcorder enables you to enjoy a live stereo sound atmosphere.

**Compatibility with the conventional 8 mm video format**
When you play back a tape recorded in AFM stereo hi-fi on a conventional 8 mm video equipment, the sound will be in monaural.

**[c] Frequency allocation of the hi-fi system**



## RC Time Code and Data Code

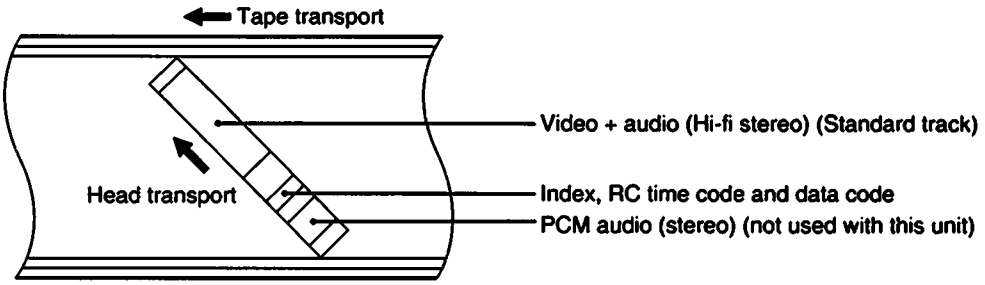
The RC time code and data code are automatically marked during camera recording and video recording. Later, you can display these codes during palyback, and edit the displayed codes onto another tape.

**What is the RC time code ?**
The RC time code indicates the absolute position of the tape with hour, minute, second and frame. Since the time code number exactly corresponds to every frame* of picture, it functions as an accurate tape counter. You can write the RC time code on a prerecorded tape as necessary.

* The TV screen displays 30 frames of pictures per second. The RC time code number advances in accordance with each frame.

**What is the data code ?**
The data code indicates the date (year, month and day) and time (hour, minute and second) when a recording is done. The data code can be displayed during playback as necessary. It is useful when you want to know the recording date and time.

**8 mm video tape format**
An 8 mm video tape track is divided into several areas so that the specified information is to be recorded in each area. This camcorder records the RC time code and data code as well as index signals in one of the areas.


Tape transport
Video + audio (Hi-fi stereo) (Standard track)
Head transport
Index, RC time code and data code
PCM audio (stereo) (not used with this unit)

## S VIDEO (Separate Luminance/Chroma Signal) Input/Output Connectors

Conventionally, video equipement exchanges the composite video signal containing the luminance (Y) signal and the chroma (C) signal mixed. The composite video signal is liable to produce interference resulting in picture quality loss. On the contrary, an S VIDEO connector transmits or receives the video signal separated into the luminance signal and the chroma signal. Flickers and color blur in the picutre are minimized with the separated video signal, and sharpness is enhanced to such an extent that hair and fine stripes are clearly visible. The S VIDEO connector also assures an excellent editing quality with minumum picture quality loss.

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